220MHz FM TRANSCEIVER

TM-3530A

SERVICE MANUAL

KENWOOD

TRIO-KENWOOD CORPORATION

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CIRCUIT DESCRIPTION

	TM-3530A
FINAL UNIT	X45-1460-10
PLL UNIT	X50-2040-10
CONTROL UNIT	X53-1440-11
DISPLAY UNIT	X54-1860-11
COMPOUND UNIT	X60-1290-10

Table 1 TM-3530A PC board chart

RX SECTION

Signals from the antenna are applied to the FINAL unit (X60-1290-10) transmit receive switching circuit, D2 and D4. In receive, diodes D2 and D4 are reverse biased forcing the incoming receive signal down thru L3 to the RA (Receive Antenna) terminal. There the incoming receive signal is then coupled to the COMPOUND Unit (X60-1290-10) The signal is filtered by low pass filter and amplified by Q1 the first RF amplifier, a GaAs FET : 3SK129(S). The amplified RF signal is then mixed with the LR (Receiver Local Oscillator) signal in the first mixer Q2 : 3SK74(L) to obtain the First IF frequency of 20.935MHz. This IF signal is filtered by Helical Resonator, L4, and a two stage MCF (Monolithic Crystal Filter), L8, which combine to provide excellent two-signal characteristics and sensitivity.

The First IF signal from the MCF is then amplified by the First IF amplifier Q3 : 2SC2668(Y) and applied to the FM IF Amplifier/Mixer/Detector, IC2 : TA7761P. This signal IC mixes the IF signal with the 20.48MHz 2nd Local Oscillator signal (L14) to obtain the 2nd IF frequency of 455kHz, then amplifies, routes the signal thru external filter L16, and finally convertes it into the received audio signal with the internal quadrature detector. The 2nd Local Oscillator signal from L14 and IC2 is also used by the PLL unit as a Reference signal.

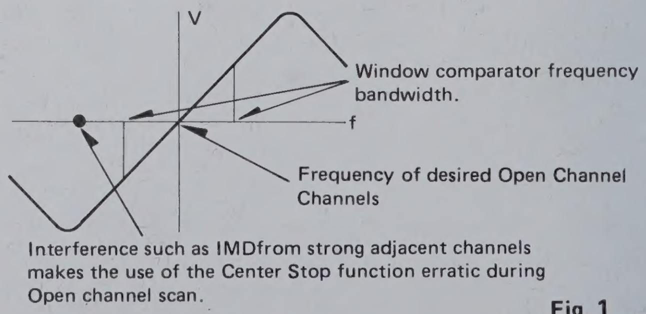
The detected audio output from IC2 is applied to the SQUELCH CONTROL (X59-1040-10), and to the de-emphasis circuit R56 and C99. The (de-emphasized) audio is amplified by Audio preamplifier Q9 : 2SC2458(Y) and then applied thru the AF GAIN control to the Audio Amplifier IC1 : μPC1241H which drives the speaker.

The noise component of the detected audio is filtered by a band-pass filter, in order to obtain a frequency of approximately 30kHz (which is well outside the normal voice bandwidth) and then amplified by the noise amplifiers contained inside IC2. This amplified noise is rectified by diodes D6 and D5 and applied to Q1 of the Squelch Switch. Q1 is used to control the conduction of Q2, which controls AF Preamp Q9.

A center-stop tuning circuit is provided to ensure that the incoming signal is actually on frequency before the squelch is opened. A portion of the 455kHz IF signal is coupled thru the secondary of L17 and applied to CENTER STOP unit (X59-1030-10) where Ceramic Discriminator L12, and Window comparator IC1 : NJM4558M are used to determine if the incoming signal is actually the channel center. When the detected signal applied to the window comparator reaches a predetermined level, Q5 of the Squelch Switch will be turned OFF or ON. The Squelch Switch determines if there is an incoming signal at the same time. If the incoming signal is at the proper level, and on frequency, the squelch will open and the C.TUNE indicator in the LCD display will turn ON. This indicator is controlled by IC2, the main microprocessor on the CONTROL unit (X53-1440-11), thru inputs supplied from the COMPOUND unit via the BD line. During Open Channel Scanning of the DCL system Q3, Q1, and Q2 of the Squelch Switch are controlled by the main microprocessor via the SQS line. During DCL operations open channel search threshold levels are controlled by VR3 of the Compound ass'y. Transistor Q6 of the Squelch Switch, is used to prevent the Center Stop circuit from activating during Open Channel Scan Operation.

Note 1 :

The Center Stop circuit is not activated during Open Channel Scan.



Window comparator frequency bandwidth.

Frequency of desired Open Channel Channels

Interference such as IMDfrom strong adjacent channels makes the use of the Center Stop function erratic during Open channel scan.

Fig. 1

Audio Preamplifier Q9 is controlled by Q1 of the Alert, Vacant CH. unit (X59-1020-10) during Alert, code Squelch and Open Channel operations.

CIRCUIT DESCRIPTION

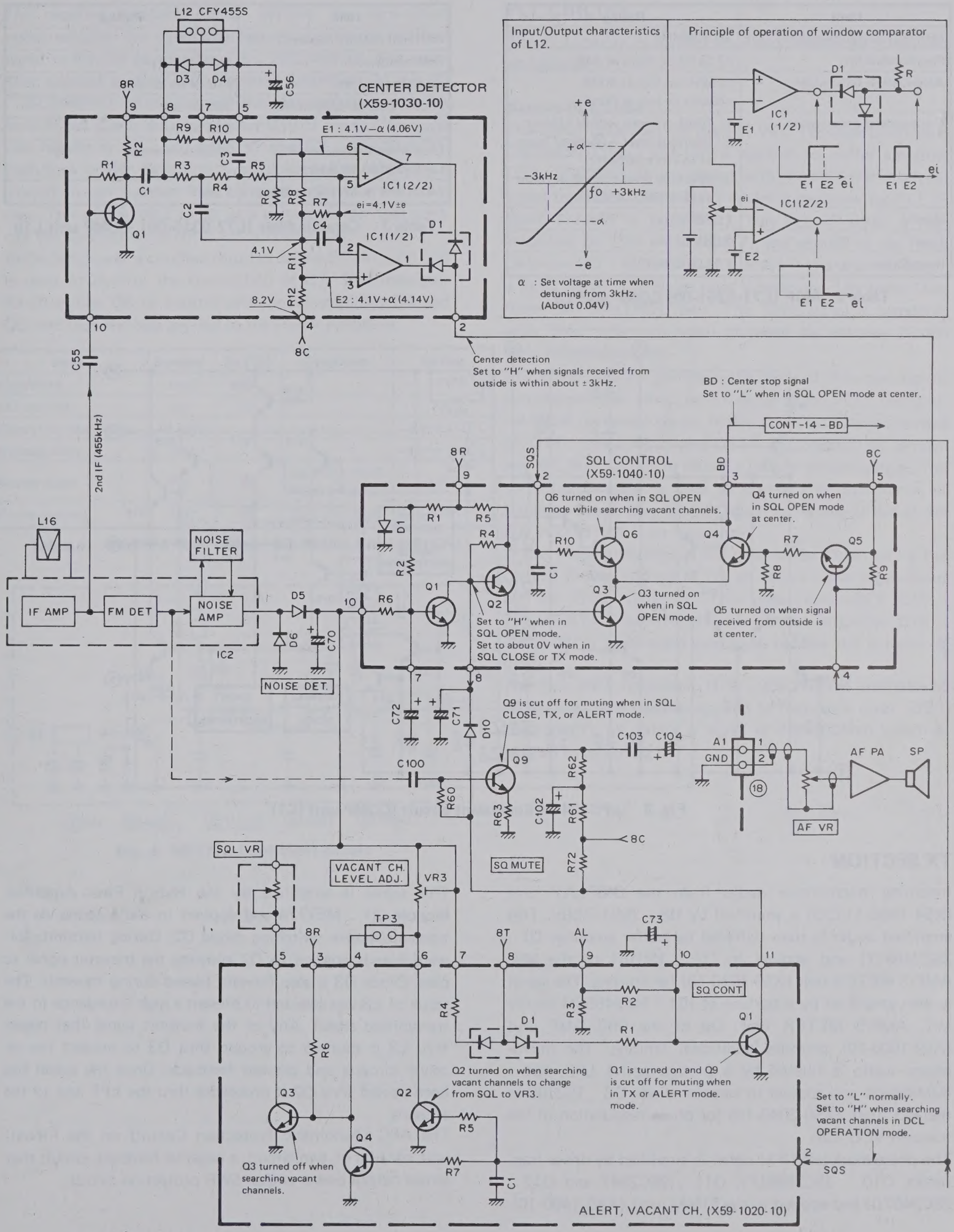

L12 CFY455S
D3
D4
C56
8R
CENTER DETECTOR
(X59-1030-10)
9
8
7
5
R9
R10
E1 : 4.1V−α (4.06V)
R2
C3
6
7
R1
R3
R5
C1
R4
5
IC1 (2/2)
R6
R8
R7
ei=4.1V±e
C2
C4
D1
Q1
4.1V
IC1 (1/2)
2
1
R11
3
R12
8.2V
E2 : 4.1V+α (4.14V)
10
4
2
8C
C55
2nd IF (455kHz)
Input/Output characteristics of L12.
+e
+α
−3kHz
fo
+3kHz
−α
−e
α : Set voltage at time when detuning from 3kHz. (About 0.04V)
Principle of operation of window comparator
D1
R
IC1 (1/2)
E1
E1 E2 ei
E1 E2
ei
ei
IC1 (2/2)
E2
E1 E2 ei
Center detection
Set to "H" when signals received from outside is within about ±3kHz.
BD : Center stop signal
Set to "L" when in SQL OPEN mode at center.
CONT-14-BD
8R
SQS
SQL CONTROL
(X59-1040-10)
BD
8C
9
2
3
5
Q6 turned on when in SQL OPEN mode while searching vacant channels.
Q4 turned on when in SQL OPEN mode at center.
L16
D1
R1
R5
R4
R10
Q6
Q4
R7
Q5
C1
R8
R9
NOISE FILTER
R2
Q3
Q3 turned on when in SQL OPEN mode.
Q1
Q2
Q5 turned on when signal received from outside is at center.
IF AMP
FM DET
NOISE AMP
D5
10
R6
Set to "H" when in SQL OPEN mode.
Set to about 0V when in SQL CLOSE or TX mode.
D6
C70
IC2
NOISE DET.
7
8
4
C72
C71
D10
Q9 is cut off for muting when in SQL CLOSE, TX, or ALERT mode.
C103
C104
A1
GND
1
2
AF PA
SP
C100
Q9
R62
R60
R63
C102
R61
18
AF VR
8C
SQL VR
VACANT CH. LEVEL ADJ.
VR3
SQ MUTE
R72
TP3
8R
8T
AL
C73
5
3
4
6
7
8
9
10
11
R4
R3
R2
SQ CONT
D1
R1
Q1
R6
Q2 turned on when searching vacant channels to change from SQL to VR3.
Q1 is turned on and Q9 is cut off for muting when in TX or ALERT mode.
Set to "L" normally.
Set to "H" when searching vacant channels in DCL OPERATION mode.
Q3
Q2
R5
Q4
2
SQS
R7
C1
Q3 turned off when searching vacant channels.
ALERT, VACANT CH. (X59-1020-10)

Fig. 2 Center detector, Alert, Vacant CH, SQL control circuit

CIRCUIT DESCRIPTION

Item	Rating
Nominal center frequency (fo)	20.935MHz
Pass bandwidth	±7.5kHz or more at 3dB
Attenuation bandwidth	±25kHz or less at 40dB ±45kHz or less at 60dB
Guraranteed attenuation	1. 70dB or more within ±1MHz 2. Spurious level = 35dB or more at fo–fo + 500kHz 3. Spurious level = 80dB or more at fo ± (890–930kHz)
Ripple	1.0dB or less
Loss	2.0dB or less
Impedance	1.1kΩ//0.5pF

Table 2 MCF (L71-0251-05) COMP unit L8

Item	Rating
Nominal center frequency (fo)	455kHz
6dB bandwidth	±6kHz or more
50dB bandwidth	±12.5kHz or more
Ripple (within 455±5kHz)	3dB or less
Loss	6dB or less
Guaranteed attenuation (within 455±100kHz)	35dB or more
Input and output impedance	2.0kΩ

Table 3 Ceramic filter (L72-0315-05) COMP unit L16

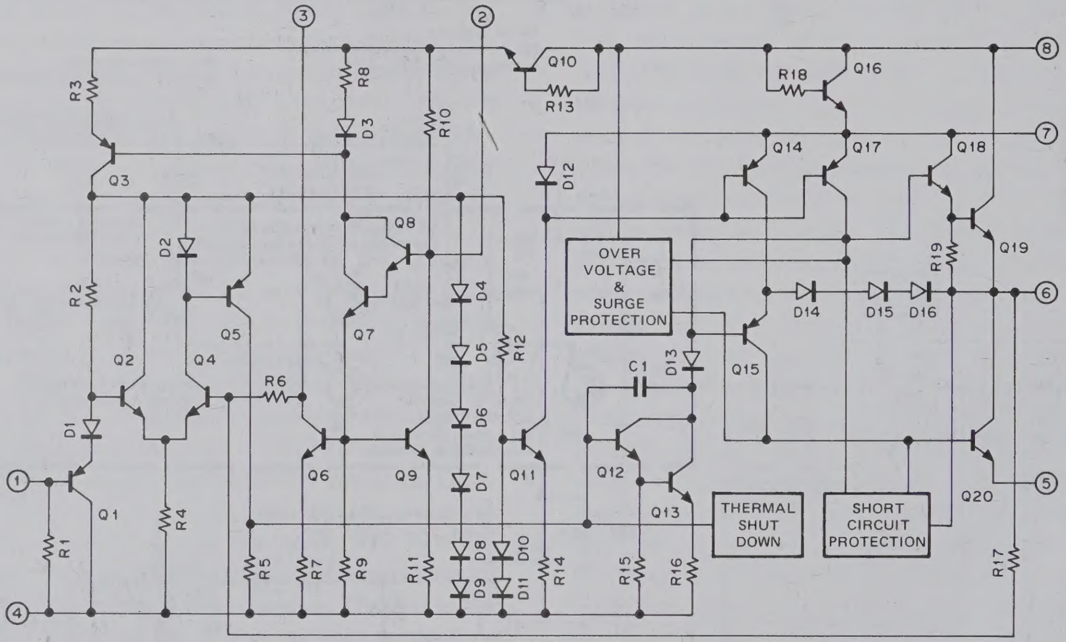


Fig. 3 μPC1241H Equivalent circuit (COMP unit IC1)

TX SECTION

Incoming microphone audio from the DISPLAY unit (X54-1860-11 C/3) is amplified by Q8 : 2SC1775(E). This amplified audio is then buffered by buffer amplifier Q7 : 2SC2458(Y) and applied to D2 : 1SS181 of the MIC AMP/S METER unit (X59-1010-10) for limiting. The signal is then amplified by a portion of IC1 : NJM4558M on the MIC AMP/S METER unit. D2 of the MIC AMP unit (X59-1000-10) provides additional limiting. The microphone audio is filtered by a 2 stage active LPF, IC1 : NJM4558M and applied to varactor diode D3 : 1S2208 in the PLL unit (X50-2040-10) for phase modulation of the transmit VCO, Q8.

The phase-modulated FM signal is amplified by driver transistors Q10 : 2SC2688(Y), Q11 : 2SC2347 and Q12 : 2SC2407(I) and applied to the FINAL unit (X45-1460-10). This signal is amplified by the Hybrid Final Amplifier Module Q1 : M57774 and applied to the antenna via the transmit/receive switching diode D2. During transmit, forward bias is applied to D2 allowing the transmit signal to pass. Diode D3 is also forward biased during transmit. The value of L3 was selected to present a high impedance to the transmitted signal. Any of the transmit signal that passes thru L3 is shunted to ground thru D3 to protect the receiver circuits and prevent feedback. Once the signal has been passed thru D2 it proceedes thru the LPF and to the antenna.

The APC (Automatic Protection Circuit) on the FINAL unit consists of two circuit, a negative feedback circuit that senses output power and an SWR protection circuit.

CIRCUIT DESCRIPTION

The negative feedback circuit samples the transmitted signal, rectifies this signal with D4, and applies the rectified signal to NF GAIN amplifier Q6 : 2SC2458(Y). This amplifier supplies a signal to Differential Amplifiers Q4 and Q5 : 2SC2458(Y) which control the bias applied to the PA module pin 2, and driver transistor Q12 of the PLL unit, via bias regulators Q2 : 2SD1406(Y) and Q3 : 2SA1015(Y). High/Low power switching is accomplished by applying a ground to pin number 1 of connector (2) on the FINAL unit. This causes VR3 to act as a voltage divider that controls the conduction of NF GAIN amplifier Q6.

Reflected power is coupled thru D5 on the FINAL unit and is used to control the conduction of Q7. This transistor function like Q6 to control differential amplifies Q4 and Q5, and thus the bias applied to the Power Amplifier.

Item	Symbol	Tc (°C)	Condition	Rating
Operating	Vcc	25		17V
DC current	Icc	25		7A
Operating case temp.	Tc (op)			–30~+110°C
Storage temp.	Tstg			–40~+110°C
Power input	Pin	25	Zg = Zl = 50Ω Vcc1 ≦ 12.5V	0.6W
Power output	Po	25	Zg = Zl = 50Ω	40W

Table 4 M57774 Max. rating (TM-3530A Final unit Q1)

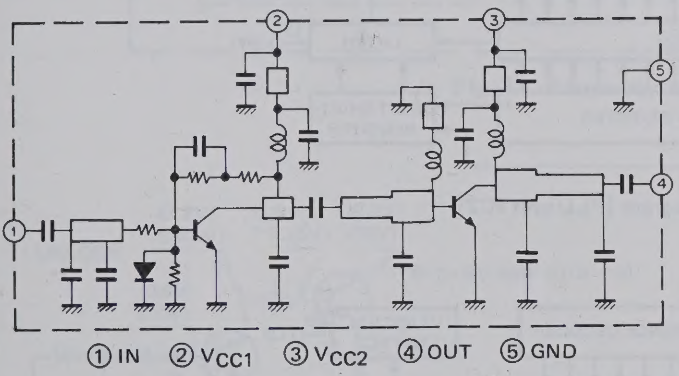


Fig. 4 M57774 Equivalent circuit

PLL CIRCUIT

The PLL circuit is divided into two main loops : transmit and receive.

Receive PLL Loop

The signal generated by the RX VCO (Voltage Controlled Oscillator) Q16 : 2SK125 is applied to buffer amplifier Q17 : 2SC2668(Y) and mixed with the HET (Heterodyne) signal by Q21 : 2SC2668(Y) where it becomes the PLL IF signal (12.865 to 17.86MHz). This PLL IF signal is then amplified by Q20 : 2SC2668(Y) and applied to the Phase Detector IC2 : MC145155P*K where it is divided to obtain a 5kHz signal. The divide ratio is determined by Serial Data from the CONTROL unit. This 5kHs signal is compared with 5kHz reference signal obtained by dividing 20.480 MHz Reference signal.

The Phase Detector compares the phase of these two signals and transmits an error control signal to the VCO. The control signal is filtered by an Active Low Pass filter composed of Q13 : 2SK30A(O) and Q14 : 2SC2458(Y) to remove any AC fluctuations to obtain a DC correction voltage. The correction voltage is used to change the capacitance of Varactor Diode D5 : 1SV50, which varies the output of the RX VCO to lock it on frequency.

If the phase difference is too great to be corrected by the control voltage applied to D5, an unlock signal is generated by the Phase Detector. This signal turns OFF Q15 : 2SC2458(Y) which turns OFF output amplifier Q18 : 2SC2668(Y) to prevent operation outside the authorized limits.

The PLL HET Oscillator, Q19 : 2SC2787(L) oscillates at 46.55MHz. This signal is applied to frequency quad Q22 : 2SC2688(Y) to obtain a signal of 186.200MHz which is applied to mixer Q21.

CIRCUIT DESCRIPTION

Transmit PLL Loop

The signal generated by the TX VCO Q8 : 2SK125 (220.00 to 224.995MHz) is mixed with the RX PLL output, by Q7 : 2SC2668(Y) and applied to the Transmit Phase Detector IC1 : MC145151P.

This signal and the 20.48MHz signal from IC2 are divided by 512, to obtain 40kHz. These two signals are compared and an error correction signal is applied to the Active Low Pass filter Q3, Q4 and Q5 : 2SC1775(E). Comparision at a frequency of 40kHz provides shorter response times, a real necessity in transmit. The DC correction voltage from the LPF is used to control varactor diode D2 : 1SV50.

The divide ratio is increased by 91 during transmit operations. This causes the TX VCO frequency to be locked at a frequency 455kHz higher than the RX VCO frequency which prevents internal mixing. When an error occurs that is greater than the correction voltage limits an unlock signal is generated by IC1. This signal controls the conduction of Q1 : 2SC2458(Y) which controls Q2 : 2SA1048(Y) to stop transmissions. Q2 interrupts the bias of the TX driver stage.

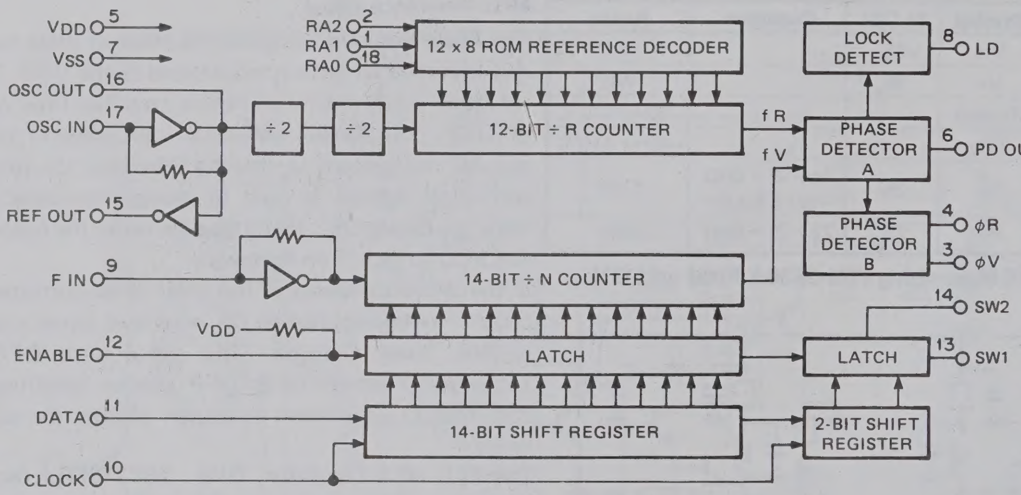


Fig. 5 MC145155P*K Block diagram (PLL unit IC2)

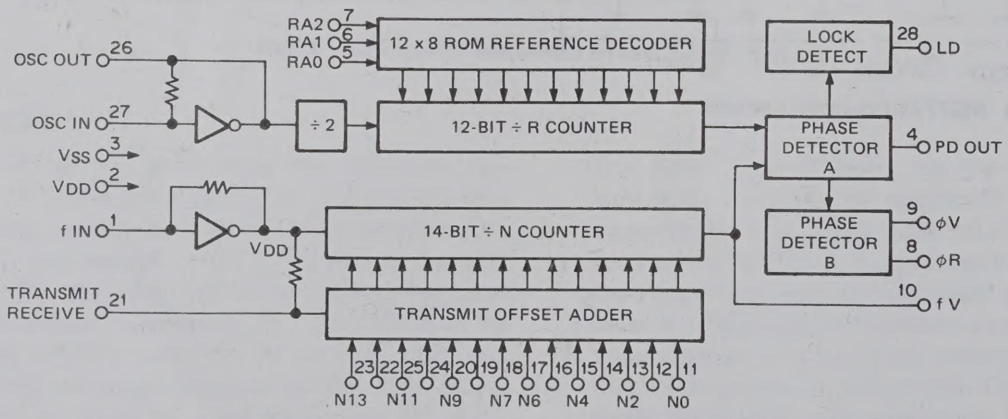


Fig. 6 MC145151P*J Block diagram (PLL unit IC1)

CIRCUIT DESCRIPTION

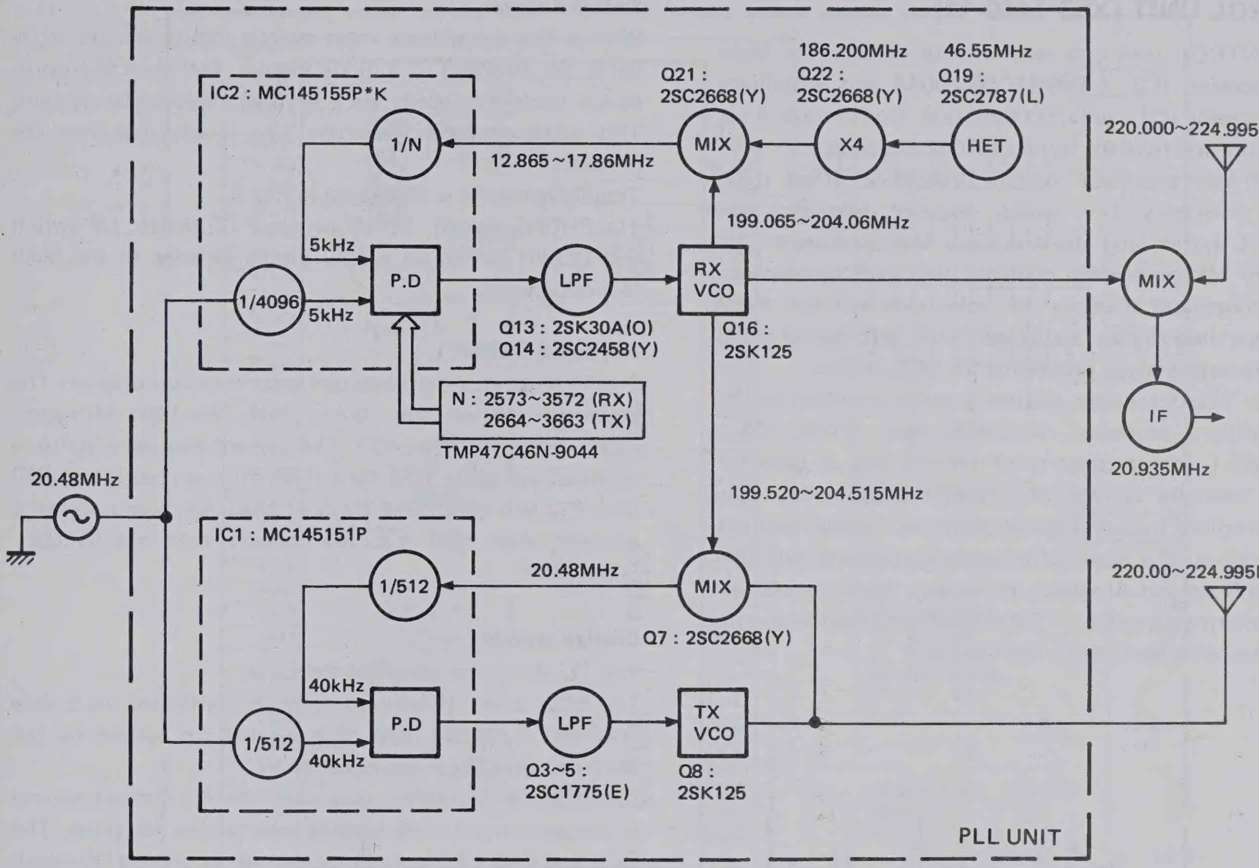
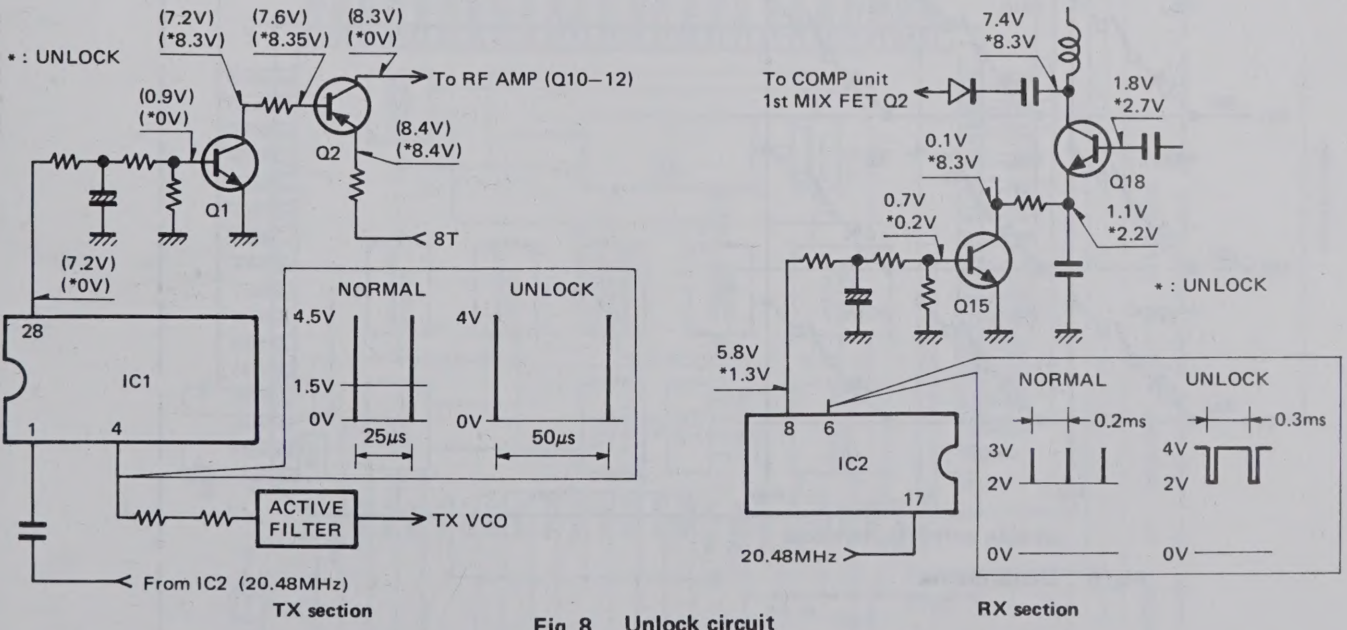


Fig. 7 Frequency-related block diagram



TX section

RX section

Fig. 8 Unlock circuit

CIRCUIT DESCRIPTION

CONTROL UNIT (X53-1440-11)

The CONTROL unit uses two Microprocessors. the Main Microprocessor IC2 : TMP47C46N-9044 and Auxilliary Microprocessor IC3 : μPD75008HC-056. Both utilize 4 bit architecture and have 4K Bytes of ROM available.

The Main Microprocessor controls; frequency, offset, tone, memory frequency, key, switch, encoder, frequency display, DCL system and the Auxilliary Microprocessor. The Auxilliary Microprocessor controls; the voice synthesizer, display/contrl/and memory for telephone number functions, tone frequencies, audio oscillator, and digital signal conversion and analysis processing for DCL system.

The Main Microprocessor utilizes a serial interface bus to the Auxilliary processor. A CMOS static RAM, IC6 : TC5047AP-1 with a capacity of 1K x 4 bits, is used for external memory storage of operator programmed data such as memory frequencies and telephone number data. It also functions as a data buffer when exchanging data between the Main and Auxilliary processors. Memory addressing is performed by IC5 : TC40H374P with read and write operations being handled by the Data Bus.

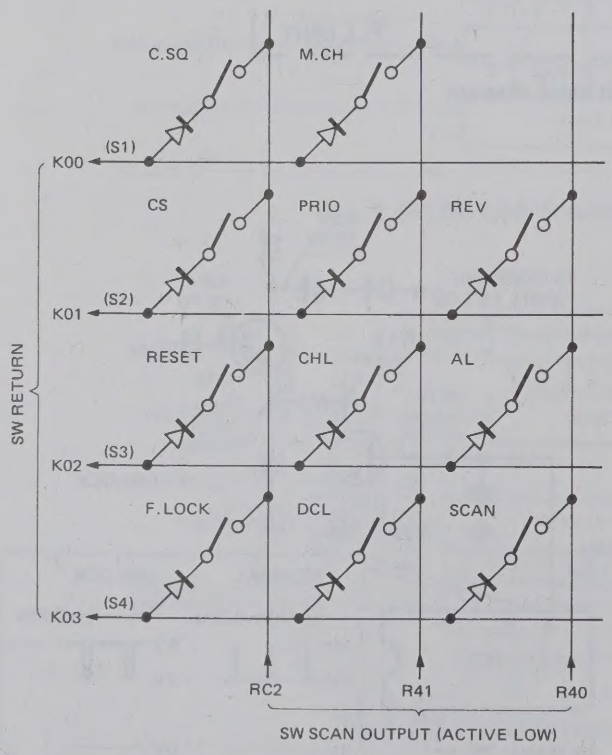


Fig. 9 Diode matrix

Switch Section

With a few exceptions most switch inputs on the front panel are arranged in a diode matrix. The Main Microprocessor reads the inputs via a keyboard status scan system. This system determines which key, if any, has been depressed.

The diode matrix is illustrated in Fig. 9.

The PHONE switch, TONE switch, PTT switch, UP switch and DOWN switch all supply inputs directly to the Main Microprocessor.

Keyboard section

Fig. 11 illustrates the keyboard section circuit diagram. The keyboard receives scan pulses from the Main Microprocessor ports P10 thru P13. The current keyboard status is returned via ports R70 thru R73. Pull-up resistors of P10 thru P13 are controlled by port R90. Keyboard status is scanned when R90 is pulled up from logic low by Q3 : DTA114YF.

Display section

Fig. 11 shows the layout of the LCD.

The LCD driver (Keyboard ass'y) is controlled via 8 data lines and 4 control lines on a parallel bus system by the Main and Auxilliary microprocessors.

Data transfer is possible only when the CS line is Low and in conjuction with the leading edge of the WE pulse. The DCL and CQS LED's are lit by transistors Q4 and Q5 which are controlled by the Main Microprocessor.

CIRCUIT DESCRIPTION

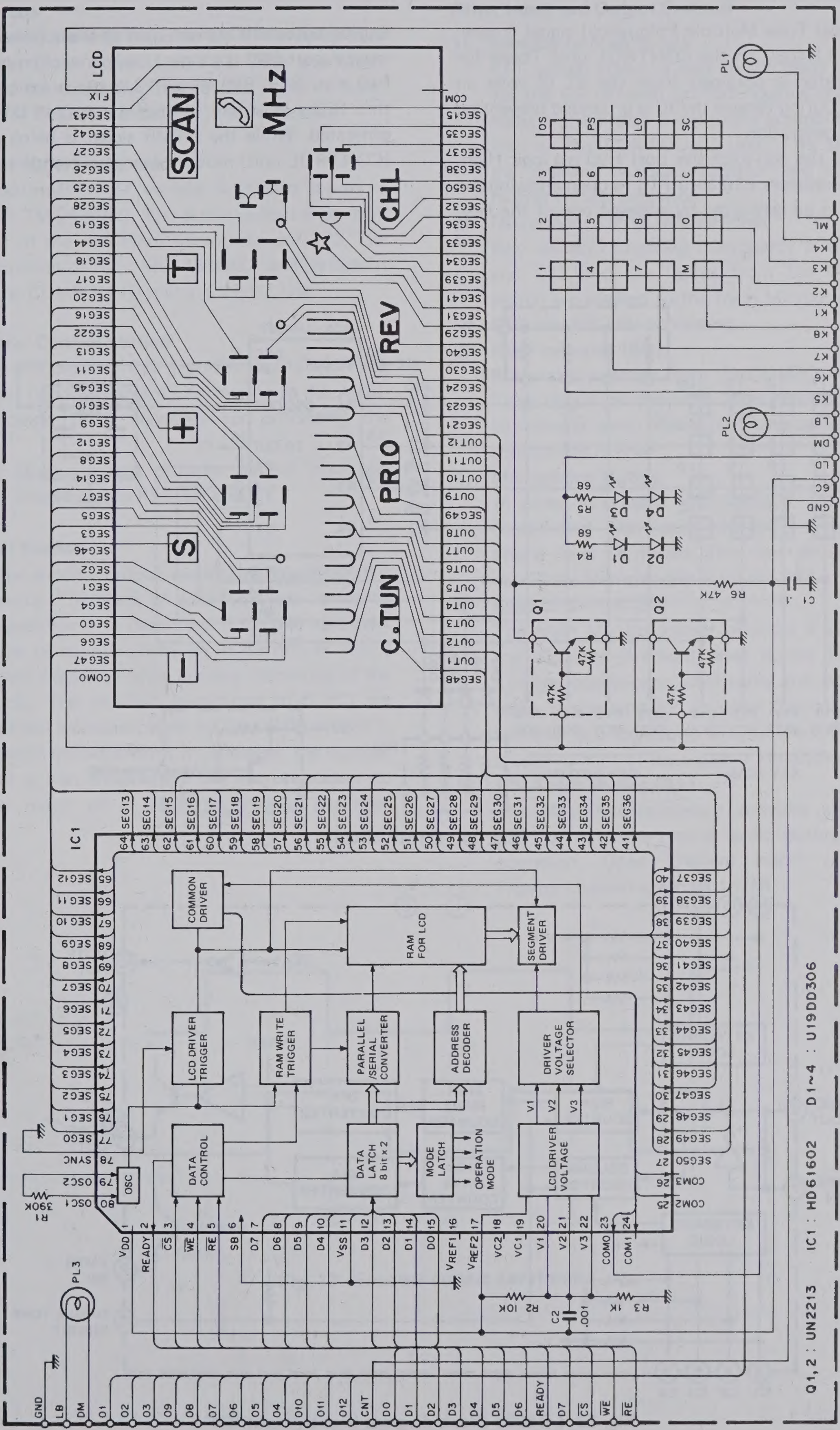


Fig. 10 Keyboard section circuit diagram

CIRCUIT DESCRIPTION

DTMF circuit

The DTMF (Dual Tone Multiple Frequency) signal is generated by IC4 : LR4087 on the CONTROL unit. Power for the tone generator is obtained from the 8T (8 volts on transmit) line. During receive the IC is grounded preventing unwanted tone generation.

During transmit the non-exclusive port R90 is a logic High, causing pull-up resistors P10 thru P13 to open allowing the DTMF signals to be generated by pressing one of the keyboard keys.

During automatic transmission of telehphone number information port R90 is a logic Low, connecting pull-up resistors P10 thru P13. P10 thru P13 apply a logic High, and P70 thru P73 a logic low, so that the desired DTMF signals are generated. While the DTMF signal is being generated IC4 (CONTROL unit) mutes the normal transmitted audio.

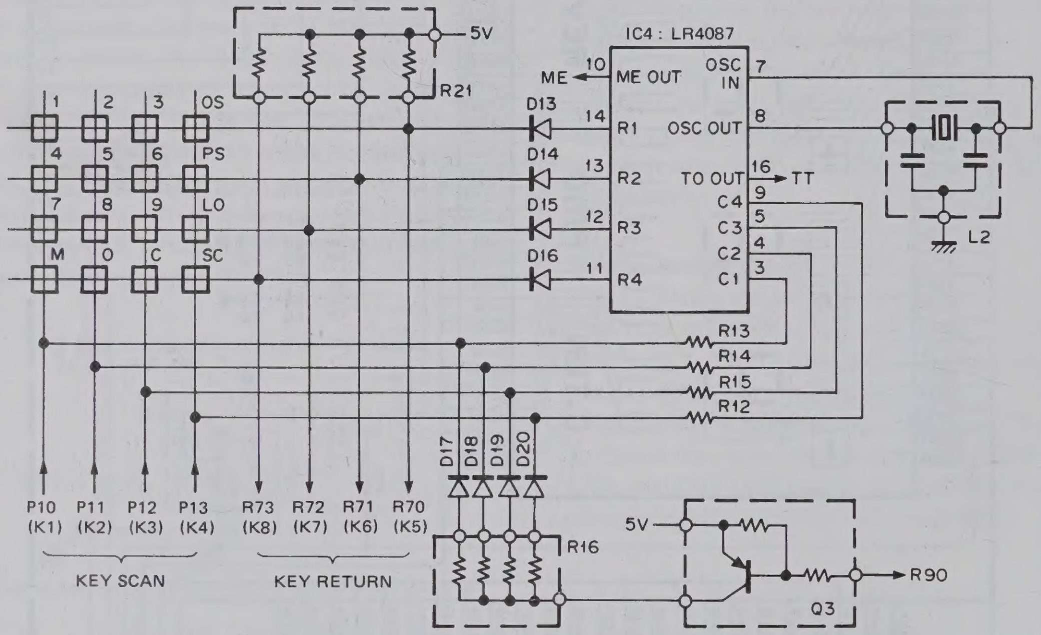


Fig. 11 DTMF circuit

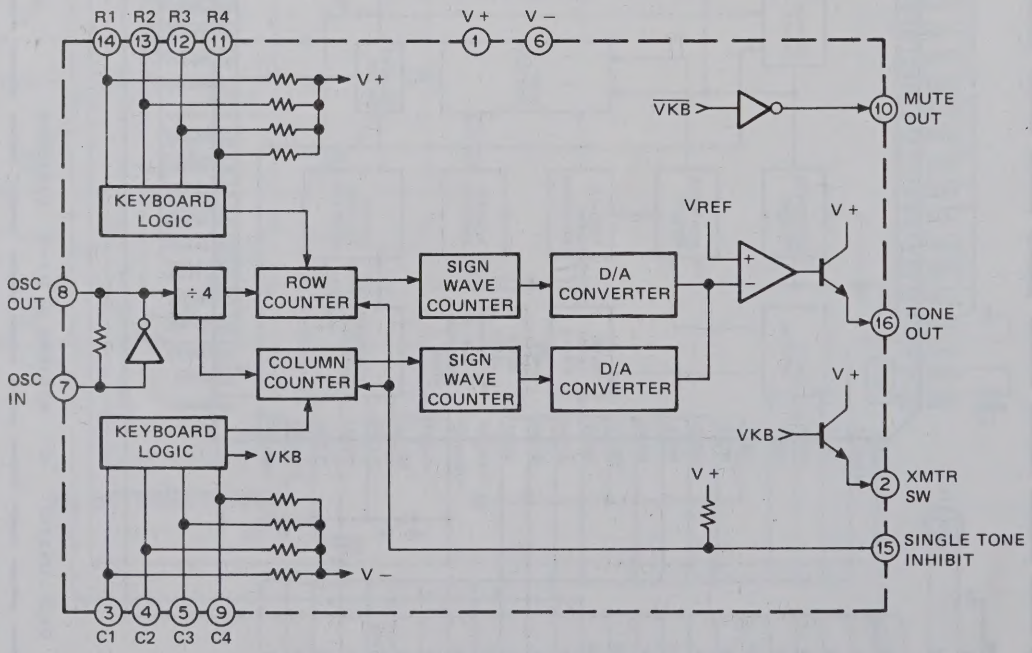


Fig. 12 LR4087 Block diagram (Control unit IC4)

CIRCUIT DESCRIPTION

PLL and Tone data

PLL and Tone data are sent from the Main Microprocessor on P30 and the Clock signal is on P33. Data and Clock signals are used concurrently. The Enable signal is transmitted on P21 for PLL data and on RC3 for tone data.

Audio Oscillator (CONTROL unit)

An audible confirmation of various keyboard inputs is provided by the TM-2530/50. This audio output is controlled via line P21 of the Auxilliary Microprocessor, IC3. The Oscillator is a portion of IC1 : MC14584BCP and its output is supplied to the COMPOUND unit via the BZ line.

Voice Synthesizer Control Section

The Main Microprocessor (IC2) analyzes inputs from the VOICE unit, and provides control information to the Auxilliary Microprocessor (IC3) necessary for processing the Voice data.

The Auxilliary Microprocessor provides control input and output via data lines PS0 thru PS4, SR and BY.

Rotary Encoder Section

Fig. 13 shows the encoder output waveforms. Waveform B is used as a reference. The phase of waveform A is compared with that of waveform B to determine if the dial base been turned clockwise or counterclockwise. A portion of IC1 is used as a Schmitt trigger to filter out any chattering of the encoder contacts. The inverted waveforms from IC1 are applied to the Main Microprocessor on pins RP0 and RP1, where the phase of the waveforms is compared. the number of input pulses is also counted by the microprocessor to detemine how much of a frequency change has been ordered.

Other Input and Output Sections

1) Standby or push-to-talk
   PTT switch status is sent to the Main Microprocessor via the SS terminal on PS1. During manual or automatic transmission a logic Low is supplied on the RA2 line to the COMPOUND unit. This signal turns on the transmit voltage regulator and turns OFF the receive voltage regulator.
2) Microphone UP/DOWN switches
   Any switch chattering (Keyboard) is filtered by C11 and C12 and the inputs from the UP and DOWN switch are applied to the Main Microprocessor on pins RB3 and RB2 for processing.
3) Busy indicator (BD)
   A signal is supplied from the COMPOUND unit Center Tune circuit to the Main Microprocessor via pin RB2 to indicate when the radio has received an input and squelch has opened.
4) Microphone Muting
   In order to prevent inteference to the Digital signals transmitted when using the DCL system the microphone must be muted. This function is controlled by Auxilliary Microprocessor via pin P61.
5) Squelch Switch (SC)
   The Main Microprocessor provides a signal to control the Squelch threshold level during Digital Channel Linkage operations. Specifically this occurs when the radio is scanning for an open channel. When the SC terminal is a logic low, VR3 of the COMPOUND unit is used to control the Squelch Threshold.
6) RX Audio Muting (AL)
   The Main Micorprocessor provides a logic High on P32 to mute the receive audio during Code Squelch operation, Open Channel search operations, and Priority channel scanning.

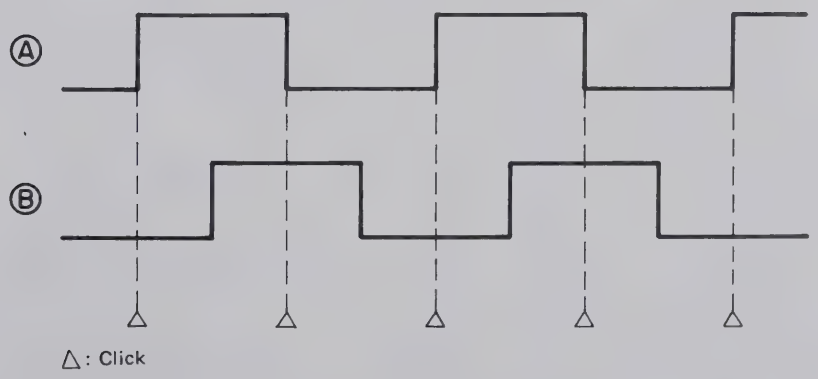


Fig. 13 Encoder output waveforms

Resetting the Microprocessor

To reset the Main Microprocessor (return to the default settings) ground pin number 49 of the Main Microprocessor. This should normally only be required when replacing the Lithium battery.

The Auxilliary microprocessor is reset by a reset pulse from IC7 : PST520D.

NOTE 2 : The operating system of this radio is in NON-ERASEABLE memory in the microprocessors. Replacing/removing the battery will not require reprogramming of Operating System paramaters. Operator programmed information (telephone numbers, memory frequencies, etc.) will require reentry.

Memory backup

Transistor Q2 : 2SC2458(Y) and zener diode D3 : MTZ7.5JA sense when the voltage supplied to the DC power connector drops below approximately 7.5 Vdc from its normal 13.8 Vdc. If the supply voltage falls below this minimum a control signal is supplied to the HOLD terminal (pin 52) of the Main Microprocessor via a Schmitt trigger. The microprocessor then enters the backup mode and draws power from the Lithium battery.

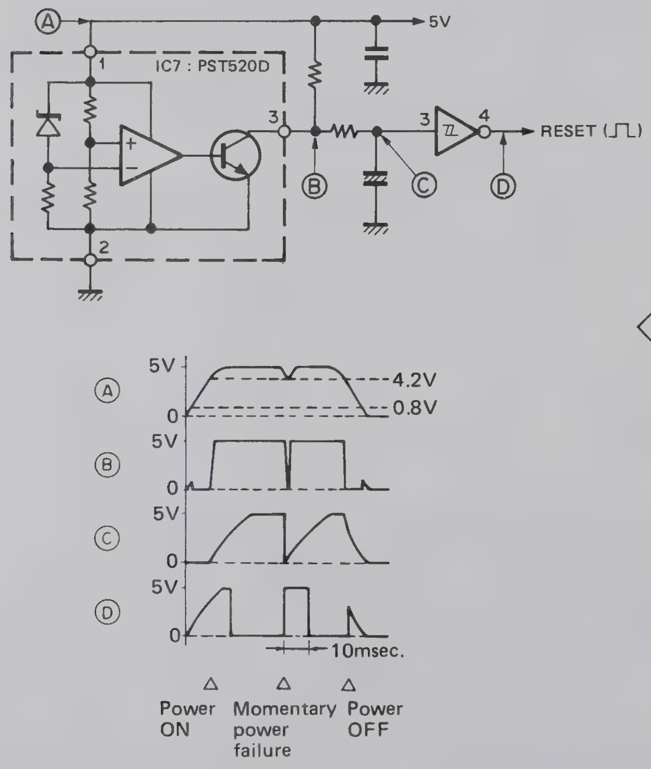


Fig. 14 Reset circuit and waveforms at respective points

DCL Contro System

A block diagram of the DCL control system is shown in Fig. 15.

Control of Open Channel searching is performed by the Main Microprocessor. The microprocessor searches for an open channel by controlling the frequency of the receiver section. When an open channel is found the frequency data of that channel is stored into RAM and a control signal is applied to the Auxilliary microprocessor. The Auxilliary microprocessor takes this signal, reads the frequency data that was stored in the RAM, generates the Digital Control signal, and applies this data to the MODEM unit (X57-1140-20). The MODEM unit uses this incoming data to generate the MSK (Minimum Shift Keying) signal which is applied to the COMPOUND unit for transmission.

A portion of the incoming receive signal is applied to the RD terminal of the MODEM unit. The MODEM unit detects the prescence of any Digital Control signal and if present relays it to the Auxilliary Microprocessor.

The Auxilliary microprocessor compares the incoming DCL signal with the preprogrammed DCL data maintained in memory. If the signals are equal a request is made to transfer the incoming data into RAM. The Main microprocessor detects this transfer request and passes the data into RAM, and transmits a signal signifying data has been received, is sounds an audible alarm.

The Main microprocessor performs any frequency shifts or code squelch functions, determined by the incoming data.

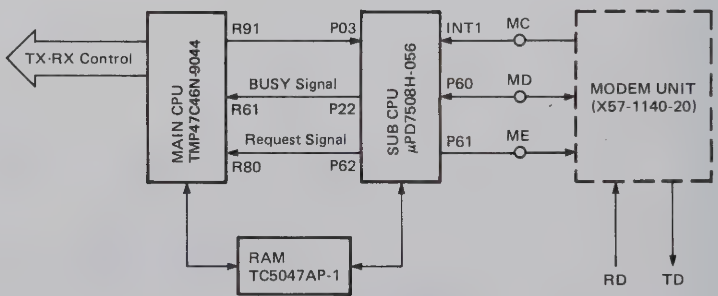


Fig. 15 DCL control system block diagram

CIRCUIT DESCRIPTION

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	RD0	I	Encoder E1		33	P20			
2	RD1	I	Encoder E2		34	P21	O	PLL Enable Signal	⊓
3	R40	I/O	Data Bus (D0)		35	P22	O	HD61602 $\overline{RE}$ Signal	⊔
4	R41	I/O	Data Bus (D1)		36	P23	O	HD61602 $\overline{WR}$ Signal	⊔
5	R42	I/O	Data Bus (D2)		37	P30	O	PLL (Tone) Data Output	
6	R43	I/O	Data Bus (D3)		38	P31	O	Squelch Control Signal	⊓
7	R50	I/O	Data Bus (D4)		39	P32	O	Audio Mute Signal	⊓
8	R51	I/O	Data Bus (D5)		40	P33	O	PLL (Tone) Clock Output	
9	R52	I/O	Data Bus (D6)		41	RB0	I	VOICE SW Input	⊔
10	R53	I/O	Data Bus (D7)		42	RB1	I	PHONE SW input	⊔
11	R60	I	HD61602 READY Signal	⊔					
12	R61	I	SUB CPU Busy Signal	⊓	43	RB2	I	MIC Down SW Input	⊔
13	R62	I	Busy Signal		44	RB3	I	MIC Up SW Input	⊔
14	R63	I	Tone SW Input	⊔	45	K00	I	SW Return (S1)	
15	R70	I	16 Key Return (K1)		46	K01	I	SW Return (S2)	
16	R71	I	16 Key Return (K2)		47	K02	I	SW Return (S3)	
17	R72	I	16 Key Return (K3)		48	K03	I	SW Return (S4)	
18	R73	I	16 Key Return (K4)		49	$\overline{RESET}$		Reset Input	⊔
19	RA0	O	Memory Lamp	⊓	50	Xin		Clock	
20	RA1	O	RAM OD Signal Output		51	Xout		Clock	
21	RA2	O	Standby Signal Output	⊔	52	$\overline{HOLD}$		Back up Information Input	⊔
22	RA3	O	RAM A8 Signal Output		53	R80	I	SUB CPU Request Signal	⊓
23	P00	O	Address Latch	⊓	54	R81	I	PTT SW Input	⊔
24	P01	O	RAM $\overline{CE1}$ Signal Output	⊔	55	R82	I	DCL Diode Matrix Input	
25	P02	O	HD61602 $\overline{CS}$ Signal Output	⊔	56	R83	I	SCAN Timer Trigger pulse	
26	P03	O	RAM CE2 Signal Output		57	R90	O	Keyboard select	
27	P10	O	16 Key Scan (K5)		58	R91	O	Serial Data Output	
28	P11	O	16 Key Scan (K6)		59	R92	O	Serial Clock Output	
29	P12	O	16 Key Scan (K7)		60	RC0	O	LED (DCL) Control	⊔
30	P13	O	16 Key Scan (K8)		61	RC1	O	LED (C.SQ) Control	⊔
31	TEST		GND		62	RC2	O	SW Scan	
32	Vss		GND		63	RC3	O	Tone DATA LOAD Signal	⊔
					64	VDD		Power Supply	

Table 5 TMP47C46N-9044 Terminal functions (Control unit IC2)

Pin No.	Name	In/Out	Function	Logic	Pin No.	Name	In/Out	Function	Logic
1	0OUT		Open		21	CL2		Clock	
2	P20	O	VS-1 PS4		22	INT1	I	Modem Clock Input	
3	P21	O	"Beeper" Switching		23	P00	I	Backup Clock Input	
4	P22	O	MAIN CPU Busy Signal	⊓	24	P01	I	Serial Clock Input	
5	P23	O	VS-1 SR		25	P02		Open	
6	P10	O	Adress Latch	⊓	26	P03	I	Serial Data Input	
7	P11				27	P60	I/O	Modem Data Input/Output	
8	P12	I	HD61602 READY Signal	⊓	28	P61	O	Modem Me Signal Output	
9	P13	O	VS-1 BY	⊓	29	P62	O	MAIN CPU Request Signal	⊓
10	P30	O	VS-1 PSO		30	P63	O	RAM A8 Signal Output	
11	P31	O	VS-1 PS1		31	P50	I/O	DATA BUS (D0)	
12	P32	O	VS-1 PS2		32	P51	I/O	DATA BUS (D1)	
13	P33	O	VS-1 PS3		33	P52	I/O	DATA BUS (D2)	
14	P70	O	RAM OD Signal Output		34	P53	I/O	DATA BUS (D3)	
15	P71	O	HD61602 $\overline{CS}$ Signal Output		35	P40	I/O	DATA BUS (D4)	
16	P72	O	RAM and HD61602 R/W		36	P41	I/O	DATA BUS (D5)	
17	P73	O	RAM $\overline{CS1}$ Signal Output		37	P42	I/O	DATA BUS (D6)	
18	RESET		Reset Input		38	P43	I/O	DATA BUS (D7)	
19	CL1		Clock		39	Vss		GND	
20	VDD		Power Supply		40	EVENT		GND	

Table 6 μPD7508H-056 Terminal functions (Control unit IC3)

CIRCUIT DESCRIPTION

TONE unit (X52-1330-20)

Incoming serial data from the Control unit is converted to parallel data by IC2 : MB88306. Serial data on the DT line, and the serial clock is on the CT line. When the ET terminal is high data is transferred, the tone output can be disabled by setting D1 to logic low. This can also be done by switching the ME terminal high.
IC1 : S7116A prevents the tone generator from oscillating outside the specified limits.

MODEM unit (X57-1140-20)

The modem Q3 : µPD65003C-20 uses a clock frequency of 3.6864MHz that is supplied across pins 18 and 19. Pin 13 is used to select transmit or receive operation of the modem. Transmit is selected when pin 13 is high, and receive when it is low. Pin 12 supplies the modem clock (1200Hz) to the MC terminal for transmit and receive clock timing purposes. Data transfers are based on this clock timing. When the transmit mode has been selected data is transferred to pins 1 thru 5 to produce the 1200 or 1800Hz MSK signal. This signal is then digital to analog converted by a ladder resistor network and applied to the TD terminal.
When the MODEM unit is in the receive mode it processes the signal applied to pin 9. This digitized Audio Frequency signal is received from the RD terminal after passing thru a band-pass filter and comparator circuit. This signal is converted by the MODEM unit and transferred thru pin 7, shaped by the LPF and comparator and applied again to pin 8.
The receive data and clock signal that are generated by the modem are based on the data applied to pins 12 and 14.

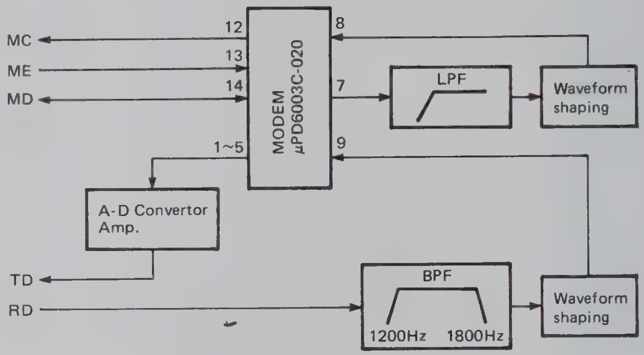


Fig. 16 MODEM unit (X57-1140-20) block diagram

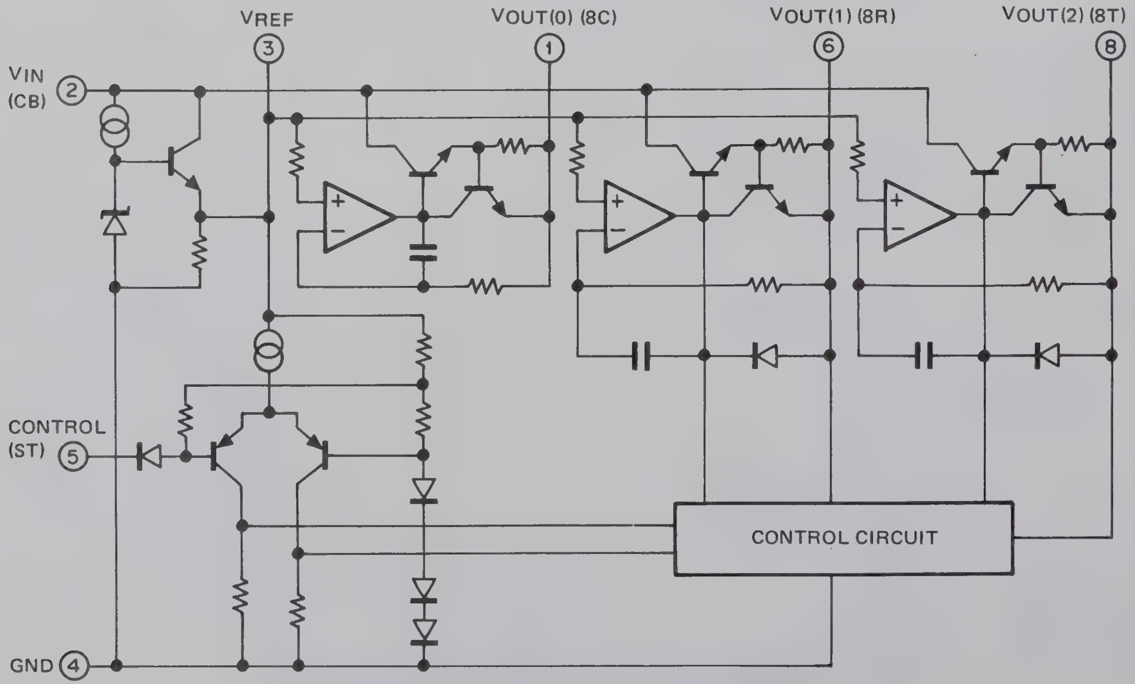


Fig. 17 MB3756 Equivalent circuit (COMP unit IC3)

CIRCUIT DESCRIPTION

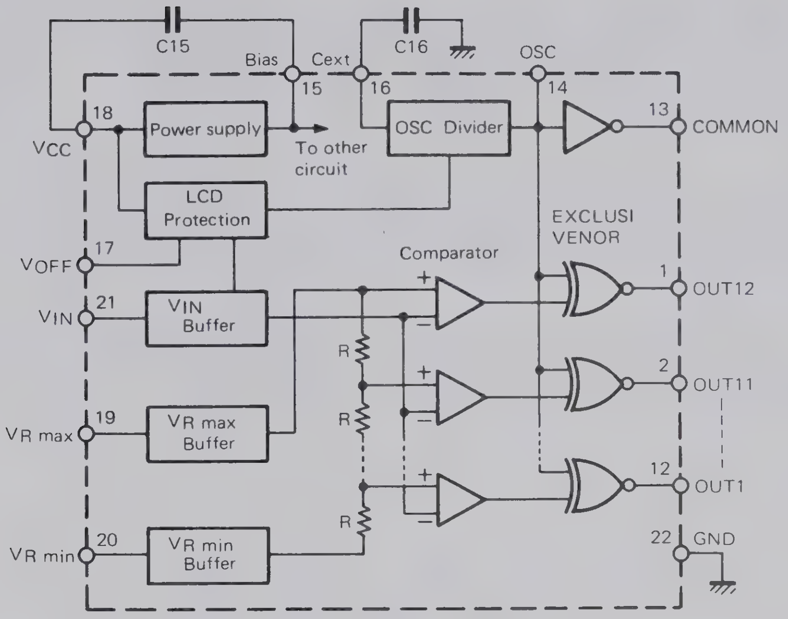


Fig. 18 IR2429 Block diagram (Display unit IC1)

Pin No.	Pin Name	I/O	Pull U/D	Part Name	Pin No.	Pin Name	I/O	Pull U/D	Remarks
3	S10	O	–	LCD		10			Level meter segment output
5	S8					8			
7	S6					6			
8	S5					5			
9	S4					4			
10	S3					3			
11	S2					2			
12	S1					1			
15	BIAS	I	–						Prevents C12 oscillation
16	C		–	GND					External clock is used; C is grounded.
18	VCC		–	Connector J6		8C2	I		8V power supply
19	VREF–MAX								Determines level 10 voltage value.
20	VREF–MIN			GND			I		Determines level 1 voltage value.
21	VIN		D R21	Connector J6		M	I		Meter input (DC)
22	GND	–	–	GND					GND pin

Note: Pins not specified must remain open.

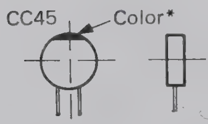
Table 7 IR2429 Terminal functions

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

1 = Type ...... ceramic, electrolyic, etc.
2 = Shape ......round, square, etc.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance



- **Capacitor value**

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF

2 2 0 = 22pF
1st number | Multiplier
2nd number

- **Temperature Coefficient**

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	–80	–150	–220	–330	–470	–750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = –470 ± 60 ppm/°C

- **Tolerance**

Code	C	D	G	J	K	M	X	Z	P	No code	
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40	+ 80	+ 100	More than	10μF–10~+50
							–20	–20	–0	Less than	4.7μF–10~+75

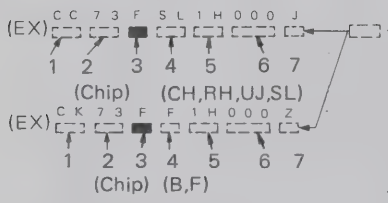
Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Less than 10 pF

- **Rating voltage**

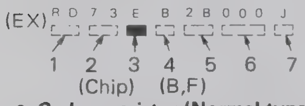
2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	–

- **Chip capacitors**

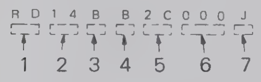


→ Refer to the above table.

- **Chip resistor (Carbon)**



- **Carbon resistor (Normal type)**



1 = Type ...... ceramic, electrolytic, etc.
2 = Shape ...... round, square, etc.
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
7 = Tolerance.

Dimension

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

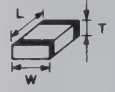
Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1 10W	2E	1 4W	3A	1W
2B	1 8W	2H	1 2W	3D	2W
2C	1 6W				

Dimension



PARTS LIST

SEMICONDUCTOR

N : New parts
* : Please note that parts are sometimes not in stock and it takes much time to deliver.

Item	Re-marks	Part No.
Diode		1N60
		1N60A
		1N4448
		1S1555
		1S1587
		1S2208
		1SS106
		1SS133
		MA856
		MC911
		MC921
		MI308
		MI407
		U15B
Chip diode	N	1SS181
	N	1SS184
Vari-cap		1SV50
Zener diode		MTZ5.6JC
		MTZ6.2JA
		MTZ7.5JA
		MTZ11JC
LED	N	LN38GPL
		LN222RP
		LN322GP
		LN442YP
	N	U19DD306
LCD	N	FSS8066
Thermister		112-502-2
TR	N	2SA790(A)
		2SA1015(Y)
		2SA1048(Y)
		2SC496(Y)
		2SC1775(E)
		2SC2347
		2SC2458(Y)
		2SC2487(L)
		2SC2668(Y)
		2SC2407(I)

Item	Re marks	Part No.
		2SD1406(Y)
Chip TR		2SC2712(BL)
		2SC2712(K)
		2SC2712(Y)
		2SC2714(Y)
Digital TR		2SC3295(B)
		DTA114YF
		DTC114ES
		DTC124EF
		DTC143TS
	N	UN2213
FET		2SK30A(O)
		2SK125
		3SK74(L)
		3SK129(S)
Power module		M57774
IC	N	HD61602
		IR2429
		LR4087
		MB3756
		MC14584BCP
		MC145151P*J
		MC145155P*K
		NE555P
		NJM78M06A
		NJM4558M
		PST520D
	N	TA7761P
		TC40H374P
		TC5047AP-1
		TMP47C46N-9042
	N	μPC1241H
		μPD7508HC-056

	TM-3530A
FINAL UNIT	X45-1460-10
PLL UNIT	X50-2040-10
CONTROL UNIT	X53-1440-11
DISPLAY UNIT	X54-1860-11
COMPOUND UNIT	X60-1290-10

PARTS LIST

⋇ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
				TM-3530A GENERAL		
1	2F,1G		A01-0996-02	METALLIC CABINET(TOP)		
2	3G		A01-0997-12	METALLIC CABINET(BOTTOM)		
3	2B,3F	*	A20-2580-03	PANEL ASSY		
4	2A		A21-0791-04	DRESSING PANEL (KEY BOARD)		
5	2A		A21-0795-04	DRESSING PANEL (DCL)		
-			A13-0666-12	MOUNTING BRACKET ASSY(R)		
-			A13-0667-12	MOUNTING BRACKET ASSY(L)		
-			A13-0668-04	MOUNTING HARDWARE		
10	2G,2F		B01-0655-13	SIDE ESCUTCHEON		
11	1F		B04-0411-04	SP METAL		
12	1F		B05-0708-04	SLP SARAN NET		
13	2F	*	B10-0679-04	FRONT GLASS		
14	3G	*	B40-3658-04	MODEL NAME PLATE		
15	2A	*	B43-1076-04	BADGE		
-			B11-0429-04	LIGHT GUIDING PLATE(AL)		
-			B11-0431-04	LIGHT GUIDING PLATE(P.MR)		
-			B11-0432-04	LIGHT GUIDING PLATE(PHONE)		
-			B11-0433-04	LIGHT GUIDING PLATE(MAIN)		
-			B11-0434-04	REFLECTION GLASS(ON AIR/F.LOCK		
-			B11-0436-04	REFLECTION GLASS(DCS,CSQ)		
-			B46-0410-00	WARRANTY CARD	K	
-		*	B50-8072-00	INSTRUCTION MANUAL		
-			E07-0852-05	8P METAL SOCKET		
-			E30-2022-15	DC CORD ASSY (ACSY)		
20	2G		F10-1206-04	GROUNDING SPRING		
21	1C		F15-0649-04	SHEET (KEYBOARD PCB)		
-			F05-8021-05	FUSE (8A) ACSY		
-			F20-0521-04	INSULATE PLATE(B) LITHIUM BTRY		
26	1A,2B		G01-0818-04	COMPRESSION SPRING (KNOB)		
27	3F		G02-0505-05	KNOB FITTING SPRING(AF/SQ)		
28	1C		G10-0642-04	SHADE CLOTH		
-			G11-0616-04	SHADE SHEET (F.LOCK)		
-			G13-0823-04	CUSHION(MOUNTING BRACKET ACSY)		
-		*	H01-8014-03	ITEM CARTON BOX(INSIDE)		
-			H10-2501-03	POLYSTYRENE FOAMED FIXTURE		
-			H10-2609-12	POLYSTYRENE FOAMED FIXTURE		
-			H25-0029-04	PROTECTION BAG (SCREW,NUT ETC)		
-			H25-0103-04	PROTECTION BAG (MIC,MNT BRKT)		
-			H25-0106-04	PROTECTION BAG		
-			H25-0116-04	PROTECTION BAG (ACSY)		
-			H25-0117-04	PROTECTION BAG (DC CORD)		
33	1F		J21-1144-34	SP MOUNTING HARDWARE (KEY IPC)		
34	1C		J21-4182-14	MOUNTING HARDWARE		
35	1B,2B		J29-0409-04	SW KNOBS GUIDE (KNOB)		
-			J02-0439-05	FOOT (ACSY)		
-			J19-1346-04	MIC HOOK (ACSY)		
-			J42-0449-05	BUSHING (PANEL)		
-			J61-0408-05	WIRE BAND		
40	3F		K21-0779-15	KNOB (MAIN)		
41	3F		K23-0779-04	KNOB (VOLUME)		
42	2A		K29-3039-05	KNOB ASSY (TACT)		

PARTS LIST

⁎ New Parts

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
43	2A		K29-3044-05	KNOB ASSY (PUSH)		
45	2B		N29-0301-04	STOPPER RING (TACT KNOB)		
-			N09-0008-04	HEX HEAD SCREW (ACSY)		
-			N09-0632-05	TAPPING SCREW (ACSY)		
-			N09-0700-04	STEPPED SCREW (FOR PANEL)		
-			N14-0510-04	FLANGE NUT (ACSY)		
-			N14-0526-14	NUT (VOL)		
-			N15-1040-45	FLAT WASHER (ACSY MNT BRKT)		
-			N15-1060-46	FLAT WASHER (ACSY)		
-			N16-0060-46	SPRING WASHER (ACSY)		
-			N32-3006-41	FLAT HEAD SCREW(CHASSIS)		
-			N33-3006-45	OVAL HEAD SCREW(SPEAKER)		
-			N35-2004-41	BINDING HEAD SCREW(DISPLAY)		
-			N35-2604-41	BINDING HEAD SCREW		
-			N87-2605-41	BRAZIER HEAD SCREW		
-			N87-3006-41	BRAZIER HEAD SCREW(GND,SPRING)		
-			N87-4008-41	BRAZIER HEAD SCREW(MIC HOOK)		
-			N89-3006-45	BINDING HEAD SCREW		
-			N99-0304-04	SCREW WITH HEX HOLE(MNT BRKT)		
-			S50-1406-05	TACT SW FOR MICROPHONE(UP/DOWN		
48	1F		T07-0241-05	LOUDSPEAKER(FULLRANGE)		
-			T91-0357-05	MICROPHONE (ACSY)		
50	1C		W02-0371-05	ROTAEY ENCODER		
-			W01-0401-05	HEX WRENCH (ACSY)		
-			W09-0326-05	LITHIUM BATTERY(BR2032)		
55	2D,2G	⁎	X45-1460-10	FINAL UNIT		
56	2G	⁎	X50-2040-10	PLL UNIT		
57	3F	⁎	X53-1440-11	CONTROL UNIT		
58	1B,1C	⁎	X54-1860-11	DISPLAY UNIT		
59	2G	⁎	X60-1290-10	COMPOUND UNIT		
FINAL (X45-1460-10)						
C1			CC45SL2H050C	CERAMIC 5.0PF C		
C2			CC45SL2H060D	CERAMIC 6.0PF D		
C3			CC45SL2H040C	CERAMIC 4.0PF C		
C4			CK45B2H102K	CERAMIC 1000PF K		
C5			CC45SL2H150J	CERAMIC 15PF J		
C6			CC45CH2H010C	CERAMIC 1.0PF C		
C7 -9			CC45SL2H150J	CERAMIC 15PF J		
C11 ,12			CC45SL2H030C	CERAMIC 3.0PF C		
C13			C90-2038-05	ELECTRO 22UF 16WV		
C14			CK45B1H102K	CERAMIC 1000PF K		
C15			C90-2038-05	ELECTRO 22UF 16WV		
C16 -19			CK45B1H102K	CERAMIC 1000PF K		
C21 -25			CK45B1H102K	CERAMIC 1000PF K		
C26			CS15E1C3R3M	TANTAL 3.3UF 16WV		
C27			C91-0667-05	CERAMIC 0.0047UF K		
C28			CK45B1H102K	CERAMIC 1000PF K		
C29			C91-0667-05	CERAMIC 0.0047UF K		
C30 -34			CK45B1H102K	CERAMIC 1000PF K		
100	1D		E04-0161-05	RF COAXIAL CABLE RECEPTACLE	M	
101	2D		E11-0401-05	PHONE JACK		
102	1D		E30-2021-35	DC CORD		

PARTS LIST

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-			E31-2109-05	CONNECTING WIRE		
105	1D,1G		F01-0935-15	HEAT SINK		
106	1D		F05-8021-05	FUSE (8A)		
-			J61-0408-05	WIRE BAND		
L1			L34-1018-05	COIL		
L2			L34-0908-05	COIL (ø3,3.5T)		
L3			L34-0894-05	COIL		
L4			L34-0499-05	COIL		
L5			L34-0908-05	COIL (ø3,3.5T)		
L6			L34-0499-05	COIL		
L7			L34-1038-05	COIL		
L8 ,9			L40-1092-14	SMALL FIXED INDUCTOR (1UH)		
N	2E,3E		N09-0626-04	SCREW (SEMUS)		
P	2E		N09-0623-04	SCREW (SEMUS)		
-			R92-0150-05	JUMPER REST 0 OHM		
R2			RD14DB2H181J	SMALL-RD 180 J 1/2W		
VR1			R12-0434-05	TRIMMING POT. (100)		
VR2			R12-4417-05	TRIMMING POT. (50K)		
VR3			R12-3455-05	TRIMMING POT. (10K)		
VR4			R12-4417-05	TRIMMING POT. (50K)		
D1			U15B	DIODE		
D2			MI407	DIODE		
D3			MI308	DIODE		
D4 ,5			1S1587	DIODE		
Q1			M57774	POWER MODULE		
Q2			2SD1406(Y)	TRANSISTOR		
Q3			2SA1015(Y)	TRANSISTOR		
Q4 -7			2SC2458(Y)	TRANSISTOR		
			PLL (X50-2040-10)			
C1			C91-0117-05	CERAMIC 0.01UF K		
C2			CS15E1VR47M	TANTAL 0.47UF 35WV		
C4			CF92V1H683J	MF 0.068UF J		
C5			C91-1008-05	CERAMIC 0.022UF K		
C6 ,7			CS15E1C2R2M	TANTAL 2.2UF 16WV		
C8			CQ92M1H393K	MYLAR 0.039UF K		
C9 ,10			CS15E1E010M	TANTAL 1.0UF 25WV		
C11			CK45B1H102K	CERAMIC 1000PF K		
C12			CC45CH1H060D	CERAMIC 6.0PF D		
C13			CC45CH1H0R5C	CERAMIC 0.5PF C		
C14			CC45UJ1H040C	CERAMIC 4.0PF C		
C15			CC45CH1H060D	CERAMIC 6.0PF D		
C17			CC45CH1H1R5C	CERAMIC 1.5PF C		
C18			C91-0117-05	CERAMIC 0.01UF K		
C19			CE04W1A470M	ELECTRO 47UF 10WV		
C20			CC45CH1H020C	CERAMIC 2.0PF C		
C21			CC45CH1H020C	CERAMIC 2.0PF C		
C22			CK45B1H102K	CERAMIC 1000PF K		
C23			CE04W1A470M	ELECTRO 47UF 10WV		
C24			CC45CH1H470J	CERAMIC 47PF J		
C25			CK45B1H102K	CERAMIC 1000PF K		
C26			CE04W1A470M	ELECTRO 47UF 10WV		

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C27			C91-0117-05	CERAMIC 0.01UF K		
C28 ,29			CK45B1H102K	CERAMIC 1000PF K		
C30			C91-0117-05	CERAMIC 0.01UF K		
C31 ,32			CK45B1H102K	CERAMIC 1000PF K		
C33			C91-0117-05	CERAMIC 0.01UF K		
C35			CE04W1C100M	ELECTRO 10UF 16WV		
C36			C91-0117-05	CERAMIC 0.01UF K		
C37 ,38			CK45B1H102K	CERAMIC 1000PF K		
C39 ,40			C91-0117-05	CERAMIC 0.01UF K		
C41			CE04W1H4R7M	ELECTRO 4.7UF 50WV		
C42			C91-0667-05	CERAMIC 0.0047UF K		
C43			CK45B1H102K	CERAMIC 1000PF K		
C44			CC45CH1H050C	CERAMIC 5.0PF C		
C46			CC45CH1H020C	CERAMIC 2.0PF C		
C47			C91-0765-05	CERAMIC 0.0047UF M		
C50			CQ92M1H223K	MYLAR 0.022UF K		
C51 ,52			CS15E1C2R2M	TANTAL 2.2UF 16WV		
C53			CE04W1A470M	ELECTRO 47UF 10WV		
C54			C91-0117-05	CERAMIC 0.01UF K		
C55			CK45B1H102K	CERAMIC 1000PF K		
C56			CF92V1H683J	MF 0.068UF J		
C57			CE04W1A470M	ELECTRO 47UF 10WV		
C58			CK45B1H102K	CERAMIC 1000PF K		
C60 ,61			CC45CH1H090D	CERAMIC 9.0PF D		
C62			CC45CH1H060D	CERAMIC 6.0PF D		
C63			CE04W1A101M	ELECTRO 100UF 10WV		
C64			C91-0117-05	CERAMIC 0.01UF K		
C65			CC45CH1H030C	CERAMIC 3.0PF C		
C66			CC45CH1H120J	CERAMIC 12PF J		
C67			CC45CH1H030C	CERAMIC 3.0PF C		
C68 ,69			CK45B1H102K	CERAMIC 1000PF K		
C70			CC45CH1H030C	CERAMIC 3.0PF C		
C71			CC45CH1H040C	CERAMIC 4.0PF C		
C72			CK45B1H102K	CERAMIC 1000PF K		
C73			CK45B1H471K	CERAMIC 470PF K		
C74			CS15E1E010M	TANTAL 1.0UF 25WV		
C75			C91-0757-05	CERAMIC 0.001UF K		
C77			CE04W1A470M	ELECTRO 47UF 10WV		
C78 ,79			C91-0117-05	CERAMIC 0.01UF K		
C80			CK45B1H221K	CERAMIC 220PF K		
C81 ,82			CC45CH1H180J	CERAMIC 18PF J		
C83			CK45B1H102K	CERAMIC 1000PF K		
C84			CC45CH1H040C	CERAMIC 4.0PF C		
C85			CC45CH1H0R5C	CERAMIC 0.5PF C		
C86			C91-0117-05	CERAMIC 0.01UF K		
C87			CC45CH1H180J	CERAMIC 18PF J		
C88			CC45CH1H330J	CERAMIC 33PF J		
C89			CK45B1H102K	CERAMIC 1000PF K		
C90			C91-0757-05	CERAMIC 0.001UF K		
C91			C91-0117-05	CERAMIC 0.01UF K		
C92			CC45CH1H180J	CERAMIC 18PF J		
C96			CK45B1H102K	CERAMIC 1000PF K		
C97			C91-0117-05	CERAMIC 0.01UF K		
C99			CC45CH1H080D	CERAMIC 8.0PF D		
C100			CC45SL1H101J	CERAMIC 100PF J		

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C105			C91-0745-05	CERAMIC 100PF K		
C108			CC45CH1H470J	CERAMIC 47PF J		
C109			CC45CH1H1R5C	CERAMIC 1.5PF C		
C110			C91-0769-05	CERAMIC 0.01UF M		
C111			CK45B1H102K	CERAMIC 1000PF K		
C112			CC45SL1H101J	CERAMIC 100PF J		
C113			CC45CH1H0R5C	CERAMIC 0.5PF C		
C115			C91-0117-05	CERAMIC 0.01UF K		
TC1			C05-0308-05	TRIMMING CAP (4P)		
TC2			C05-0031-15	TRIMMING CAP (10P)		
TC3			C05-0030-15	TRIMMING CAP (20P)		
TC4			C05-0308-05	TRIMMING CAP (4P)		
-			E04-0154-05	RF COAXIAL CONNECTOR		
-			E23-0512-05	TERMINAL		
-			E31-2170-15	CONNECTING WIRE		
-			E40-0273-05	PIN CONNECTOR (2P)		
-			E40-0573-05	PIN CONNECTOR (5P)		
-			E40-0673-05	PIN CONNECTOR (6P)		
L1			L40-3391-03	SMALL FIXED INDUCTOR (3.3UH)		
L2		*	L32-0684-05	OSCILLATING COIL (2.5T)		
L3			L40-1021-03	SMALL FIXED INDUCTOR (1MH)		
L4			L34-0893-05	COIL (4T)		
L5			L34-1023-05	COIL (3T)		
L6			L34-0893-05	COIL (4T)		
L7			L34-1023-05	COIL (3T)		
L8			L40-2292-14	SMALL FIXED INDUCTOR (2.2UH)		
L10		*	L32-0684-05	OSCILLATING COIL (2.5T)		
L12			L34-0895-05	COIL		
L13			L40-3391-14	SMALL FIXED INDUCTOR (3.3UH)		
L14 ,15			L34-2049-05	COIL		
L17			L32-0681-05	OSCILLATING COIL		
L18		*	L77-1298-05	CRYSTAL OSCILLATOR (46.55MHZ		
L19			L40-1001-14	SMALL FIXED INDUCTOR (10UH)		
L20			L40-3382-14	SMALL FIXED INDUCTOR (0.33UH)		
L21			L40-1092-14	SMALL FIXED INDUCTOR (1UH)		
C94			R90-0600-05	MULTI-COMP (100PX4)		
R39			RD14DB2H220J	SMALL-RD 22 J 1/2W		
D1			1S1555	DIODE		
D2 ,3			1S2208	DIODE		
D4			1S1555	DIODE		
D5			1S2208	DIODE		
D6			MTZ6.2JA	ZENER DIODE		
IC1		*	MC145151P*J	IC(PARA INPUT PLL FREQ SYNTHE)		
IC2			MC145155P*K	IC		
Q1			2SC2458(Y)	TRANSISTOR		
Q2			2SA1048(Y)	TRANSISTOR		
Q3 -5			2SC1775(E)	TRANSISTOR		
Q6 -7			2SC2668(Y)	TRANSISTOR		
Q8			2SK125	FET		
Q9			2SC2458(Y)	TRANSISTOR		
Q10			2SC2668(Y)	TRANSISTOR		
Q11			2SC2347	TRANSISTOR		

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Q12			2SC2407(1)	TRANSISTOR		
Q13			2SK30A(O)	FET		
Q14 ,15			2SC2458(Y)	TRANSISTOR		
Q16			2SK125	FET		
Q17 ,18			2SC2668(Y)	TRANSISTOR		
Q19			2SC2787(L)	TRANSISTOR		
Q20 -22			2SC2668(Y)	TRANSISTOR		
CONTROL (X53-1440-11)						
C1			CK45B1H102K	CERAMIC 1000PF K		
C2			CE04CW1A330M	ELECTRO 33UF 10WV		
C3			CE04W1A101M	ELECTRO 100UF 10WV		
C4			C91-1008-05	CERAMIC 0.022UF K		
C5			CE04W1A470M	ELECTRO 47UF 10WV		
C7			CK45B1H681K	CERAMIC 680PF K		
C8			CK45B1H102K	CERAMIC 1000PF K		
C9			CK45B1H182K	CERAMIC 1800PF K		
C10 -16			C91-1008-05	CERAMIC 0.022UF K		
C17			CE04W1E3R3M	ELECTRO 3.3UF 25WV		
C18			CE04W1H010M	ELECTRO 1.0UF 50WV		
C19 ,20			C91-1008-05	CERAMIC 0.022UF K		
C23 ,24			C91-1008-05	CERAMIC 0.022UF K		
C25 -28			CK45B1H102K	CERAMIC 1000PF K		
C29 -31			C91-0745-05	CERAMIC 100PF K		
C66			CS15E1A100M	TANTAL 10UF 10WV		
-			E23-0465-05	TERMINAL		
-			E23-0512-05	TERMINAL		
-			E40-5016-05	PIN CONNECTOR (2P)		
-			E40-5017-05	PIN CONNECTOR (3P)		
-			E40-5018-05	PIN CONNECTOR (4P)		
-			E40-5019-05	PIN CONNECTOR (5P)		
-			E40-5021-05	PIN CONNECTOR (7P)		
-			E40-5022-05	PIN CONNECTOR (8P)		
-		⁎	E40-5065-05	PIN CONNECTOR (9P)		
L1			L78-0013-05	RESONATOR (CST4.19MG)		
L2			L78-0012-05	RESONATOR (CST3.58MG)		
L3			L78-0013-05	RESONATOR (CST4.19MG)		
R8			R90-0202-05	MULTI-COMP 47KX4 J 1/6W		
R16			R90-0286-05	MULTI-COMP 4.7KX4 J 1/6W		
R19			R90-0233-05	MULTI-COMP 10KX4 J 1/6W		
R20			R90-0281-05	MULTI-COMP 10KX6 J 1/6W		
R21			R90-0291-05	MULTI-COMP 100KX4 J 1/6W		
R22			R90-0595-05	MULTI-COMP 10KX10 J		
R35			R90-0594-05	MULTI-COMP 4.7KX11 J		
VR1			R12-7408-05	TRIMMING POT. (500K)		
D1			MC911	DIODE		
D2			1N4448	DIODE		
D2			1S1555	DIODE		
D3			MTZ7.5JA	ZENER DIODE		
D4 -8			1N4448	DIODE		
D4 -8			1S1555	DIODE		
D11			1N4448	DIODE		
D11			1S1555	DIODE		
D13 -22			1N4448	DIODE		

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D13 -22			1S1555	DIODE		
D23			MTZ5.6JC	ZENER DIODE		
D24			1N4448	DIODE		
D24			1S1555	DIODE		
D25 ,26			1SS106	DIODE		
D27 ,28			1N4448	DIODE		
D27 ,28			1S1555	DIODE		
D29			1SS133	DIODE		
IC1			MC14584BCP	IC		
IC2		*	TMP47C46N-9044	IC (CPU)		
IC3			UPD7508HC-056	IC (CPU)		
IC4			LR4087	IC		
IC5			TC40H374P	IC		
IC6			TC5047AP-1	IC		
IC7			PST520D	IC(LOW POWER RESET)		
Q1			DTC124EF	DIGITAL TRANSISTOR		
Q2			2SC2458(Y)	TRANSISTOR		
Q3 ,4			DTA114YF	DIGITAL TRANSISTOR		
Q6			DTC143TS	DIGITAL TRANSISTOR		
DISPLAY (X54-1860-11)						
C1 -7			CK45B1H102K	CERAMIC 1000PF K		
C8			CE04CW1C4R7M	ELECTRO 4.7UF 16WV		
C9 -11			CK45B1H102K	CERAMIC 1000PF K		
C12 -14			CK73FB1H102K	CHIP C 1000PF K		
C15 ,16			C91-0117-05	CERAMIC 0.01UF K		
C17 ,18			CK45B1H471K	CERAMIC 470PF K		
C19			CC45SL1H101J	CERAMIC 100PF J		
131	1B		E06-0858-05	8P MIC CONNECTOR		
-			J61-0408-05	WIRE BAND		
-			R92-0150-05	JUMPER REST 0 OHM		
VR1			R05-3436-05	POTENTIOMETER (10K) AF		
VR2			R05-4415-05	POTENTIOMETER (50K) SQ		
-			S59-0435-05	KEY BOARD ASSY		
S1 -3			S40-2443-05	PUSH SWITCH (LOCK)		
S4 ,5			S40-2444-05	PUSH SWITCH (NON-LOCK)		
S6 ,7			S40-2443-05	PUSH SWITCH (LOCK)		
S8			S40-2444-05	PUSH SWITCH (NON-LOCK)		
S9 -16			S50-1426-05	SENSITIVE SWITCH		
-			FSS8066	LCD (FOR KEY BOARD)		
-			HD61602	IC (FOR KEY BOARD)		
D1 -5			1N4448	DIODE		
D1 -5			1S1555	DIODE		
D6 ,7			MC921	DIODE		
D8 ,9			1N4448	DIODE		
D8 ,9			1S1555	DIODE		
D10 -13			LN38GPL	LED		
D14			LN222RP	LED		
D15			LN322GP	LED		
D16 ,17			LN442YP	LED		
IC1			IR2429	IC		
Q1			DTC124EF	DIGITAL TRANSISTOR		
Q2			2SA790(A,B)	TRANSISTOR		

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MIC AMP. (X59-1000-10)						
R1			RK73FB2A682J	CHIP R 6. 8K J 1/10W		
R2			RK73FB2A221J	CHIP R 220 J 1/10W		
R3			RK73FB2A104J	CHIP R 100K J 1/10W		
R4			RK73FB2A153J	CHIP R 15K J 1/10W		
R5			RK73FB2A333J	CHIP R 33K J 1/10W		
R6 -8			RK73FB2A224J	CHIP R 220K J 1/10W		
R9			RK73FB2A474J	CHIP R 470K J 1/10W		
R10			RK73FB2A153J	CHIP R 15K J 1/10W		
R11			RK73FB2A562J	CHIP R 5. 6K J 1/10W		
R12			RK73FB2A184J	CHIP R 180K J 1/10W		
R13			RK73FB2A224J	CHIP R 220K J 1/10W		
R14			RK73FB2A474J	CHIP R 470K J 1/10W		
C1			CC73FSL1H390J	CHIP C 39PF		
C2			CK73FB1H152K	CHIP C 0. 0015UF		
C3			CC73FSL1H331K	CHIP C 330PF		
C4			CC73FSL1H561K	CHIP C 560PF		
C5			CC73FSL1H331K	CHIP C 330PF		
D1		*	1SS184	CHIP DIODE		
D2		*	1SS181	CHIP DIODE		
IC1			NJM4558M	IC(OP AMP X2)		
Q1			2SC2712(Y)	CHIP TR		
MIC AMP., S-METER (X59-1010-10)						
R1			RK73FB2A473J	CHIP R 47K J 1/10W		
R2			RK73FB2A474J	CHIP R 470K J 1/10W		
R3			RK73FB2A473J	CHIP R 47K J 1/10W		
R4			RK73FB2A474J	CHIP R 470K J 1/10W		
R5			RK73FB2A224J	CHIP R 220K J 1/10W		
R6			RK73FB2A184J	CHIP R 180K J 1/10W		
R7			RK73FB2A473J	CHIP R 47K J 1/10W		
R8			RK73FB2A472J	CHIP R 4. 7K J 1/10W		
R9			RK73FB2A103J	CHIP R 10K J 1/10W		
R10			RK73FB2A822J	CHIP R 8. 2K J 1/10W		
C1			CK45FB1H472K			
D1			1SS184	CHIP DIODE		
D2			1SS181	CHIP DIODE		
IC1			NJM4558M	IC(OP AMP X2)		
ALERT, VACANT CH. (X59-1020-10)						
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2			RK73FB2A472J	CHIP R 4. 7K J 1/10W		
R3			RK73FB2A223J	CHIP R 22K J 1/10W		
R4			RK73FB2A273J	CHIP R 27K J 1/10W		
R5 -7			RK73FB2A103J	CHIP R 10K J 1/10W		
C1			CK73FB1H102K	CHIP C 0. 001UF		
D1			1SS181	CHIP DIODE		
Q1 -4			2SC2712(Y)	CHIP TRANSISTOR		
CENTER DETECTOR (X59-1030-10)						
R1			RK73FB2A224J	CHIP R 220K J 1/10W		
R2			RK73FB2A222J	CHIP R 2. 2K J 1/10W		
R3			RK73FB2A332J	CHIP R 3. 3K J 1/10W		
R4			RK73FB2A333J	CHIP R 33K J 1/10W		
R5 ,6			RK73FB2A104J	CHIP R 100K J 1/10W		
R7			RK73FB2A563J	CHIP R 56K J 1/10W		

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R8			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R9 ,10			RK73FB2A103J	CHIP R 10K J 1/10W		
R11			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R12			RK73FB2A104J	CHIP R 100K J 1/10W		
R13 ,14			R92-0670-05	CHIP R 0 OHM		
C1 ,2			CK73FB1H102K	CHIP C 0.001UF		
C3 ,4			CK73FF1E473Z	CHIP C 0.047UF		
C5			CK73FB1H102K	CHIP C 0.001UF		
D1			1SS181	CHIP DIODE		
IC1			NJM4558M	IC(OP AMP X2)		
Q1			2SC2714(Y)	CHIP TRANSISTOR		
COMPOUND (X60-1290-10)						
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2			RK73FB2A223J	CHIP R 22K J 1/10W		
R3			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R4			RK73FB2A474J	CHIP R 470K J 1/10W		
R5			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R6			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R7			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R8			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R9			RK73FB2A393J	CHIP R 39K J 1/10W		
R10			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R11			R92-0670-05	CHIP R 0 OHM		
C1			CK73FB1H102K	CHIP C 0.001UF		
D1			1SS184	CHIP DIODE		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
Q2 ,3			2SC3295(B)	CHIP TRANSISTOR		
Q4			2SC2712(BL)	CHIP TRANSISTOR		
Q5			2SC2712(Y)	CHIP TRANSISTOR		
Q6			2SC2712(BL)	CHIP TRANSISTOR		
SQUELCH CONTROL (X59-1040-10)						
C1			CC45CH1H180J	CERAMIC 18PF J		
C2			CC45RH1H120J	CERAMIC 12PF J		
C3			CC45CH1H010C	CERAMIC 1.0PF C		
C4			CC45RH1H070D	CERAMIC 7.0PF D		
C5			CC45CH1H180J	CERAMIC 18PF J		
C6			CK45B1H102K	CERAMIC 1000PF K		
C7			C91-0117-05	CERAMIC 0.01UF K		
C8			CK45B1H102K	CERAMIC 1000PF K		
C9			C91-0117-05	CERAMIC 0.01UF K		
C10			CK45B1H102K	CERAMIC 1000PF K		
C11			CC45CH1H010C	CERAMIC 1.0PF C		
C12			CC45CH1H120J	CERAMIC 12PF J		
C13			CC45CH1H050C	CERAMIC 5.0PF C		
C14			CC45SL1H680J	CERAMIC 68PF J		
C15 ,16			C91-0117-05	CERAMIC 0.01UF K		
C17			CC45CH1H100D	CERAMIC 10PF D		
C18			C91-0117-05	CERAMIC 0.01UF K		
C19			CK45B1H681K	CERAMIC 680PF K		
C20 ,21			C91-0117-05	CERAMIC 0.01UF K		
C22			C91-0757-05	CERAMIC 0.001UF K		
C23			C91-0117-05	CERAMIC 0.01UF K		
C24			CQ92M1H473K	MYLAR 0.047UF K		

PARTS LIST

⋇ New Parts

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C25			CE04W1H010M	ELECTRO 1.0UF 50WV		
C25			C90-2033-05	ELECTRO 1000UF 16WV		
C28 ,29			CE04W1A470M	ELECTRO 47UF 10WV		
C31			CQ92M1H104K	MYLAR 0.10UF K		
C32			CE04W1A221M	ELECTRO 220UF 10WV		
C33			CE04W1A470M	ELECTRO 47UF 10WV		
C34 ,35			C91-0117-05	CERAMIC 0.01UF K		
C36			CC45SL1H101J	CERAMIC 100PF J		
C37			CC45CH1H070D	CERAMIC 7.0PF D		
C38			CC45CH1H180J	CERAMIC 18PF J		
C39			C91-0117-05	CERAMIC 0.01UF K		
C40			CE04W1A470M	ELECTRO 47UF 10WV		
C41			CC45CH1H240J	CERAMIC 24PF J		
C42			CK45B1H471K	CERAMIC 470PF K		
C43			CK45B1H102K	CERAMIC 1000PF K		
C44			CC45CH1H330J	CERAMIC 33PF J		
C45			C91-0667-05	CERAMIC 0.0047UF K		
C46			CC45CH1H330J	CERAMIC 33PF J		
C47			C91-0117-05	CERAMIC 0.01UF K		
C48			CC45SL1H121J	CERAMIC 120PF J		
C49			CK45B1H102K	CERAMIC 1000PF K		
C50			C91-0117-05	CERAMIC 0.01UF K		
C51			C91-0117-05	CERAMIC 0.01UF K		
C52 -54			CF92V1H104J	MF 0.10UF J		
C55			CK45B1H102K	CERAMIC 1000PF K		
C56			CE04W1H010M	ELECTRO 1.0UF 50WV		
C57			CK45B1H102K	CERAMIC 1000PF K		
C58 ,59			C91-0117-05	CERAMIC 0.01UF K		
C60			CE04W1C330M	ELECTRO 33UF 16WV		
C61			C91-0117-05	CERAMIC 0.01UF K		
C62			CE04W1C100M	ELECTRO 10UF 16WV		
C63			CE04W1C330M	ELECTRO 33UF 16WV		
C64			C91-0117-05	CERAMIC 0.01UF K		
C65			CE04W1C100M	ELECTRO 10UF 16WV		
C66			C91-0117-05	CERAMIC 0.01UF K		
C67			CE04W1C100M	ELECTRO 10UF 16WV		
C68			CE04W1A101M	ELECTRO 100UF 10WV		
C69			C91-0117-05	CERAMIC 0.01UF K		
C70			CS15E1C2R2M	TANTAL 2.2UF 16WV		
C71			CS15E1VR68M	TANTAL 0.68UF 35WV		
C72			CS15E1V010M	TANTAL 1.0UF 35WV		
C73			CE04W1A470M	ELECTRO 47UF 10WV		
C74			C91-0117-05	CERAMIC 0.01UF K		
C76			CK45B1H102K	CERAMIC 1000PF K		
C77			CE04W1HR47M	ELECTRO 0.47UF 50WV		
C79 ,80			C91-0117-05	CERAMIC 0.01UF K		
C81			CQ92M1H333K	MYLAR 0.033UF K		
C82 -85			CE04W1H010M	ELECTRO 1.0UF 50WV		
C86			CK45B1H102K	CERAMIC 1000PF K		
C87			CE04W1C470M	ELECTRO 47UF 16WV		
C88			CE04W1H010M	ELECTRO 1.0UF 50WV		
C89			CK45B1H152K	CERAMIC 1500PF K		
C90			CE04W1C100M	ELECTRO 10UF 16WV		
C93			CE04W1A470M	ELECTRO 47UF 10WV		
C94			CK45B1H102K	CERAMIC 1000PF K		

PARTS LIST

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C95			CE04W1H0R1M	ELECTRO 0.1UF 50WV		
C96			CC45SL1H101J	CERAMIC 100PF J		
C97			CK45B1H102K	CERAMIC 1000PF K		
C98			C91-1008-05	CERAMIC 0.022UF K		
C99			CQ92M1H153K	MYLAR 0.015UF K		
C100			CQ92M1H183K	MYLAR 0.018UF K		
C101			CQ92M1H333K	MYLAR 0.033UF K		
C102			CE04W1A470M	ELECTRO 47UF 10WV		
C103			CQ92M1H473K	MYLAR 0.047UF K		
C104			CE04W1H010M	ELECTRO 1.0UF 50WV		
C115			CK45B1H102K	CERAMIC 1000PF K		
C116			C91-0117-05	CERAMIC 0.01UF K		
C117			CK45B1H102K	CERAMIC 1000PF K		
C118			CQ92M1H153K	MYLAR 0.015UF K		
TC1			C05-0328-05	TRIMMING CAP (50P)		
-			E40-0211-05	PIN CONNECTOR (2P)		
-			E40-0273-05	PIN CONNECTOR (2P)		
-			E40-0373-05	PIN CONNECTOR (3P)		
-			E40-0473-05	PIN CONNECTOR (4P)		
-			E40-0573-05	PIN CONNECTOR (5P)		
-			E40-0873-05	PIN CONNECTOR (8P)		
JP9			E31-1959-05	CONNECTING WIRE		
JP10			E31-2170-15	CONNECTING WIRE		
JP12-14			E31-2170-15	CONNECTING WIRE		
JP23			E31-2170-15	CONNECTING WIRE		
JP27			E31-1960-05	CONNECTING WIRE		
JP35			E31-2170-15	CONNECTING WIRE		
JP37			E31-2170-15	CONNECTING WIRE		
JP39			E31-2170-15	CONNECTING WIRE		
-			F02-0417-04	HEAT SINK(CAP/ADDITION TYPE)		
L1 ,2		⁎	L34-2264-05	COIL (220MHZ)		
L3			L15-0306-05	LOW-FREQUENCY CHOKE COIL		
L4		⁎	L79-0683-05	HELICAL RESONATOR		
L5		⁎	L34-2265-05	COIL (PLL HZT)		
L6			L34-0749-05	COIL (21.6MHZ)		
L7		⁎	L30-0535-05	IFT (21MHZ)		
L8			L71-0251-05	MCF		
L9		⁎	L30-0536-05	IFT (21MHZ)		
L10 ,11			L40-1021-12	SMALL FIXED INDUCTOR(1MH)		
L12			L79-0446-05	FILTER (CFY455S)		
L13			L40-1001-14	SMALL FIXED INDUCTOR(10UH)		
L14			L77-1260-05	CRYSTAL RESONATOR(20.480MHZ)		
L15			L30-0531-05	IFT (455KHZ)		
L16			L72-0315-05	CERAMIC FILTER (CFW455F)		
L17			L30-0503-05	IFT (455KHZ)		
L19			L34-1023-05	COIL (/3.3T)		
R42			RS14KB3D330J	FL-PROOF RS 33 J 2W		
VR1			R12-2413-05	TRIMMING POT. (5K)		
VR2 -4			R12-4413-05	TRIMMING POT. (50K)		
VR5			R12-3443-05	TRIMMING POT. (10K)		
VR6			R12-5420-05	TRIMMING POT. (100K)		
VR7			R12-2413-05	TRIMMING POT. (5K)		

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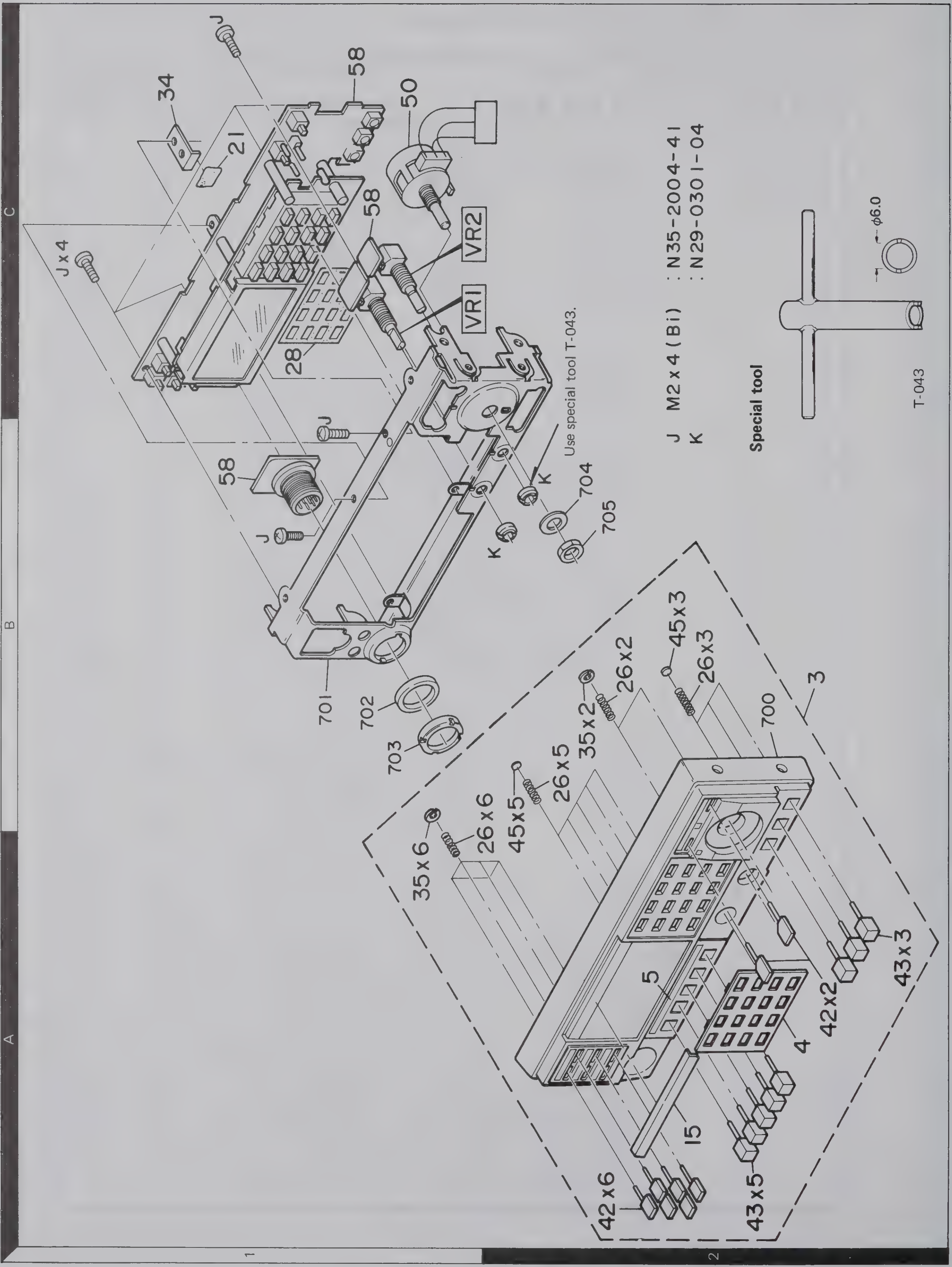
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D1 ,2			1N4448	DIODE		
D1 ,2			1S1555	DIODE		
D3 ,4			1N60	DIODE		
D5 ,6			1N4448	DIODE		
D5 ,6			1S1555	DIODE		
D7			MTZ11JC	ZENER DIODE		
D8			1N4448	DIODE		
D8			1S1555	DIODE		
IC1			UPC1241H	IC		
IC2			TA7761P	IC		
IC3			MB3756	IC		
IC4			NJM78M06A	IC		
Q1 ,2			3SK129(S)	FET		
Q3 ,4			2SC2668(Y)	TRANSISTOR		
Q5			2SC496(Y)	TRANSISTOR		
Q6 ,7			2SC2458(Y)	TRANSISTOR		
Q8			2SC1775(E)	TRANSISTOR		
Q9			2SC2458(Y)	TRANSISTOR		
Q10 ,11			DTC114ES	DIGITAL TRANSISTOR		
Q12			2SC3113(B)	TRANSISTOR		
TH1			112-502-2	THERMISTOR		
TH2			112-302-2	THERMISTOR		
-			X59-1000-10	MIC AMP UNIT		
-			X59-1010-10	MIC AMP,S-METER UNIT		
-			X59-1020-10	ALERT VACANT CH UNIT		
-			X59-1030-10	CENTER STOP UNIT		
-			X59-1040-10	SQ UNIT		

DISASSEMBLY



Use special tool T-043.

J M2 x 4 (Bi) : N35-2004-41
K : N29-0301-04

Special tool

Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. **DC V.M**
   1) High input impedance
2. **RF VTVM (RF V.M)**
   1) Input impedance : 1MΩ min., 2pF max.
   2) Voltage range : F.S = 10mV ~ 300V
   3) Frequency range : Up to 220MHz
3. **Frequency Counter (f. counter)**
   1) Input sensitivity : Approx. 50mV
   2) Frequency range : Up to 220MHz
4. **DC Power Supply**
   1) Voltage : 10V ~ 17V, variable
   2) Current : 8A min.
5. **RF Power Meter**
   1) Measurement range Approx. : 50W
   2) Input impedance : 50Ω
   3) Frequency range : 220MHz
6. **AF VTVM (AF V.M)**
   1) Input impedance : 1MΩ min.
   2) Voltage range : F.S = 1mV ~ 30V
   3) Frequency range : 50Hz ~ 10kHz
7. **AF Generator (AG)**
   1) Output frquency : 100Hz ~ 10kHz
   2) Output voltage : 0.5mV ~ 1V
8. **Linear Detector**
   1) Frequency range : 220MHz
9. **Field Strength Meter**
   1) Frequency range : 220MHz
10. **Directional Coupler**
11. **Oscilloscope**
    1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
    1) Frequency range : 144~225MHz
    2) Modulation : AM and FM MOD.
    3) Output level : −20dB to 100dB
13. **Dummy Load**
    1) 8Ω, 5W (approx.)
14. **Sweep Generator**
    1) Sweep range : 220~225MHz
15. **Tracking generator**

PREPARATION

1) Unless otherwise specified, knobs and switches should be set as follows **Table 10.**

POWER SW	ON	SQUELCH VR	MIN
AL. SW	OFF	AF GAIN VR	MIN
PRIO SW	OFF	PHONE SW	OFF
LAMP SW	OFF	TONE SW	OFF
REV SW	OFF	VOICE SW	OFF
SCAN SW	OFF	DCL SW	OFF
LOW SW	OFF	C. SQ SW	OFF
F. LOCK SW	OFF	CS SW	OFF

Table 10

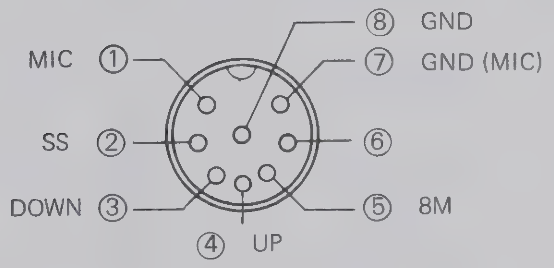
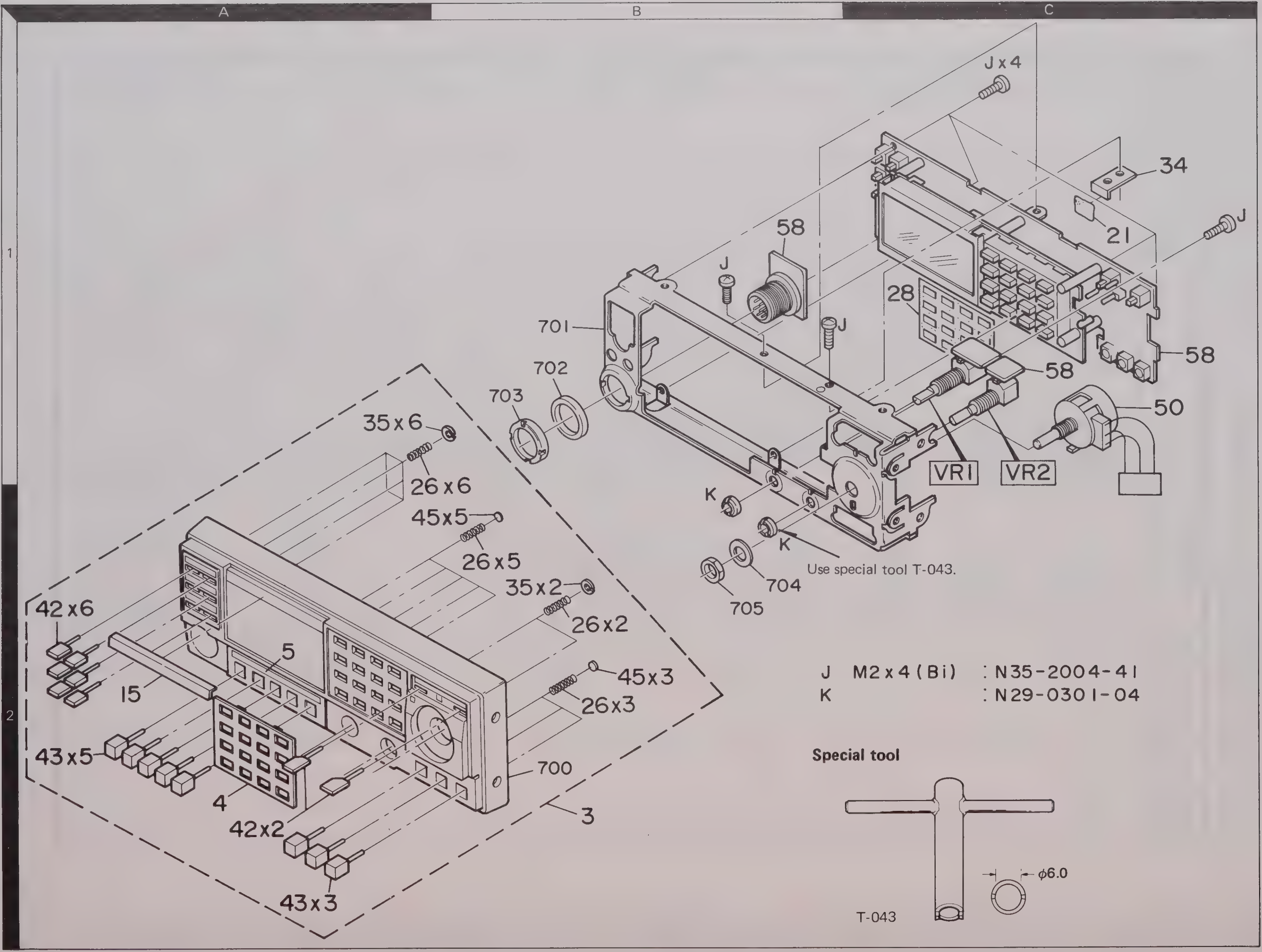


Fig. 19 MIC terminals (view from front panel side)

2) Use an insulated adjusting rod to adjust trimmers and coils.
3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
5) SSG output levels are those at the time the output terminal is open.

DISASSEMBLY



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K : N29-0301-04

Special tool

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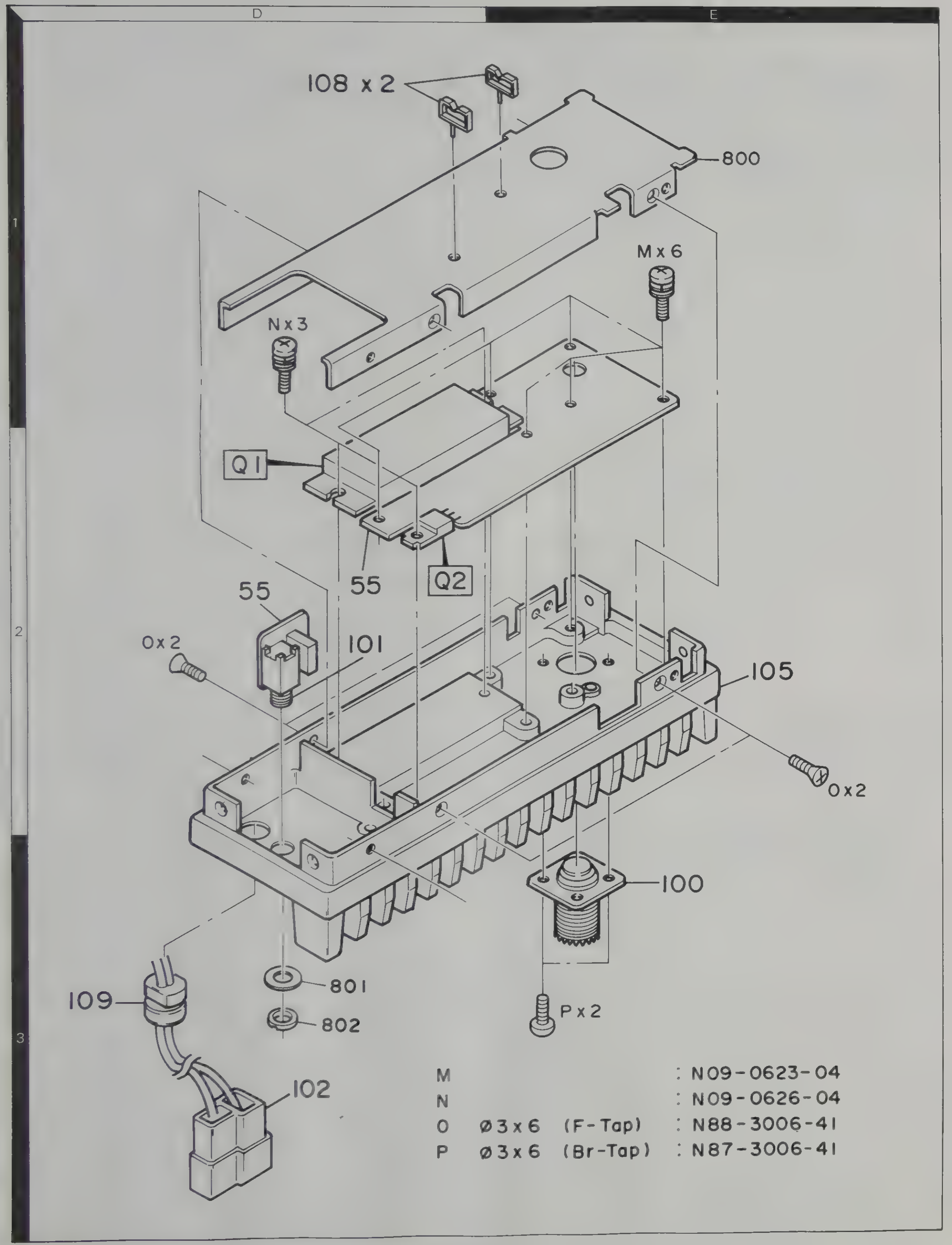

M : N09-0623-04
N : N09-0626-04
O ø3x6 (F-Tap) : N88-3006-41
P ø3x6 (Br-Tap) : N87-3006-41

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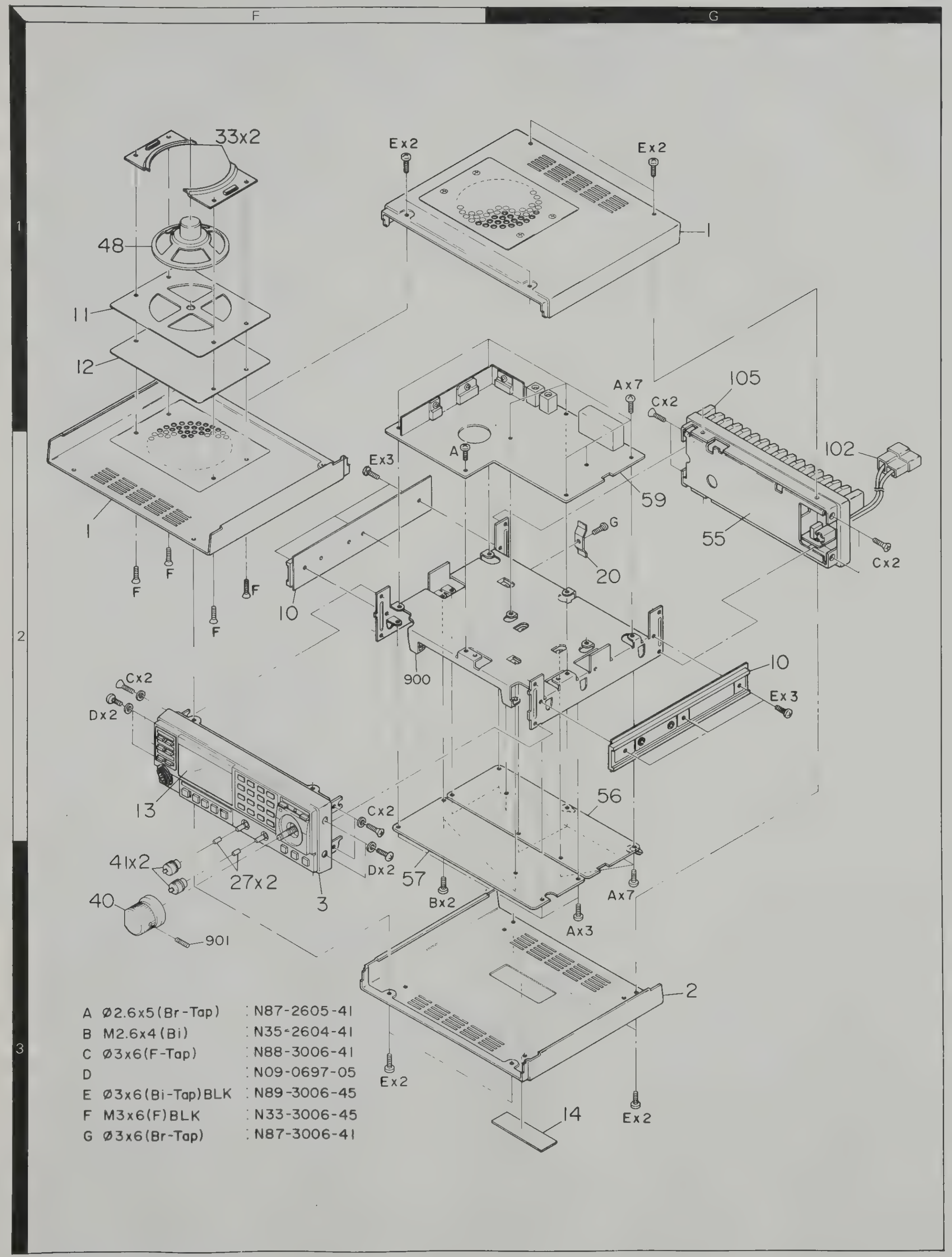
DISASSEMBLY



A ø2.6x5(Br-Tap) : N87-2605-41
B M2.6x4(Bi) : N35-2604-41
C ø3x6(F-Tap) : N88-3006-41
D : N09-0697-05
E ø3x6(Bi-Tap)BLK : N89-3006-45
F M3x6(F)BLK : N33-3006-45
G ø3x6(Br-Tap) : N87-3006-41

Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

REQUIRED TEST EQUIPMENT

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   1) High input impedance
2. **RF VTVM (RF V.M)**
   1) Input impedance : 1MΩ min., 2pF max.
   2) Voltage range : F.S = 10mV ~ 300V
   3) Frequency range : Up to 220MHz
3. **Frequency Counter (f. counter)**
   1) Input sensitivity : Approx. 50mV
   2) Frequency range : Up to 220MHz
4. **DC Power Supply**
   1) Voltage : 10V ~ 17V, variable
   2) Current : 8A min.
5. **RF Power Meter**
   1) Measurement range Approx. : 50W
   2) Input impedance : 50Ω
   3) Frequency range : 220MHz
6. **AF VTVM (AF V.M)**
   1) Input impedance : 1MΩ min.
   2) Voltage range : F.S = 1mV ~ 30V
   3) Frequency range : 50Hz ~ 10kHz
7. **AF Generator (AG)**
   1) Output frquency : 100Hz ~ 10kHz
   2) Output voltage : 0.5mV ~ 1V
8. **Linear Detector**
   1) Frequency range : 220MHz
9. **Field Strength Meter**
   1) Frequency range : 220MHz
10. **Directional Coupler**
11. **Oscilloscope**
    1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
    1) Frequency range : 144~225MHz
    2) Modulation : AM and FM MOD.
    3) Output level : −20dB to 100dB
13. **Dummy Load**
    1) 8Ω, 5W (approx.)
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    1) Sweep range : 220~225MHz
15. **Tracking generator**

PREPARATION

1) Unless otherwise specified, knobs and switches should be set as follows **Table 10.**

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REV SW	OFF	VOICE SW	OFF
SCAN SW	OFF	DCL SW	OFF
LOW SW	OFF	C. SQ SW	OFF
F. LOCK SW	OFF	CS SW	OFF

Table 10

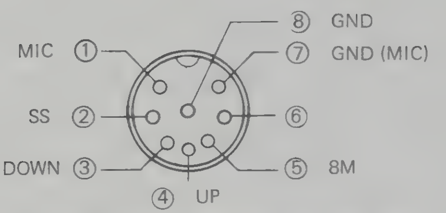


Fig. 19 MIC terminals (view from front panel side)

2) Use an insulated adjusting rod to adjust trimmers and coils.
3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
5) SSG output levels are those at the time the output terminal is open.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5–2. PROTECTION (Current)	1) ANT : Open	DC supply V.M			FINAL	VR2	3A ADJ.	6A or less
	2) After adjusted, connect the power meter.							
6. MIC GAIN DEV.	1) Turn VR7 fully CCW. MIC 50mV/1kHz	Linear detector			COMP.	VR5	±4.5kHz ADJ.	±100Hz
	2) MIC 5mV/1kHz					VR7	±3.0kHz ADJ.	±100Hz
7. FREQ. check	1) Display : 3.000	f.counter						223.000±500Hz
8. TONE	1) Install TU7 in the CONTROL Press TONE key then, turn the encoder dial to 88.5kHz transmit.	Linear detector f.counter						DEV. 0.6–0.9kHz FREQ. 88.5kHz Check output wave of linear detector output. display.
11. Touch tone	1) Transmit Press '3', '6' key at the same time.	Linear detector f.counter			COMP.	VR1	3kHz ADJ.	±0.2kHz 1471.9Hz±1%
12. SCAN	1) SCAN SW : T0 (Confirm VR1 at 12 o'clock.) SQL VR : ↶ MIN (CCW) Key board : Press "SC"				CONT.	VR1	Check scan time changed when VR1 turn.	
	2) After ADJ. Key board : Press "C"				CONT.	VR1	Centered.	

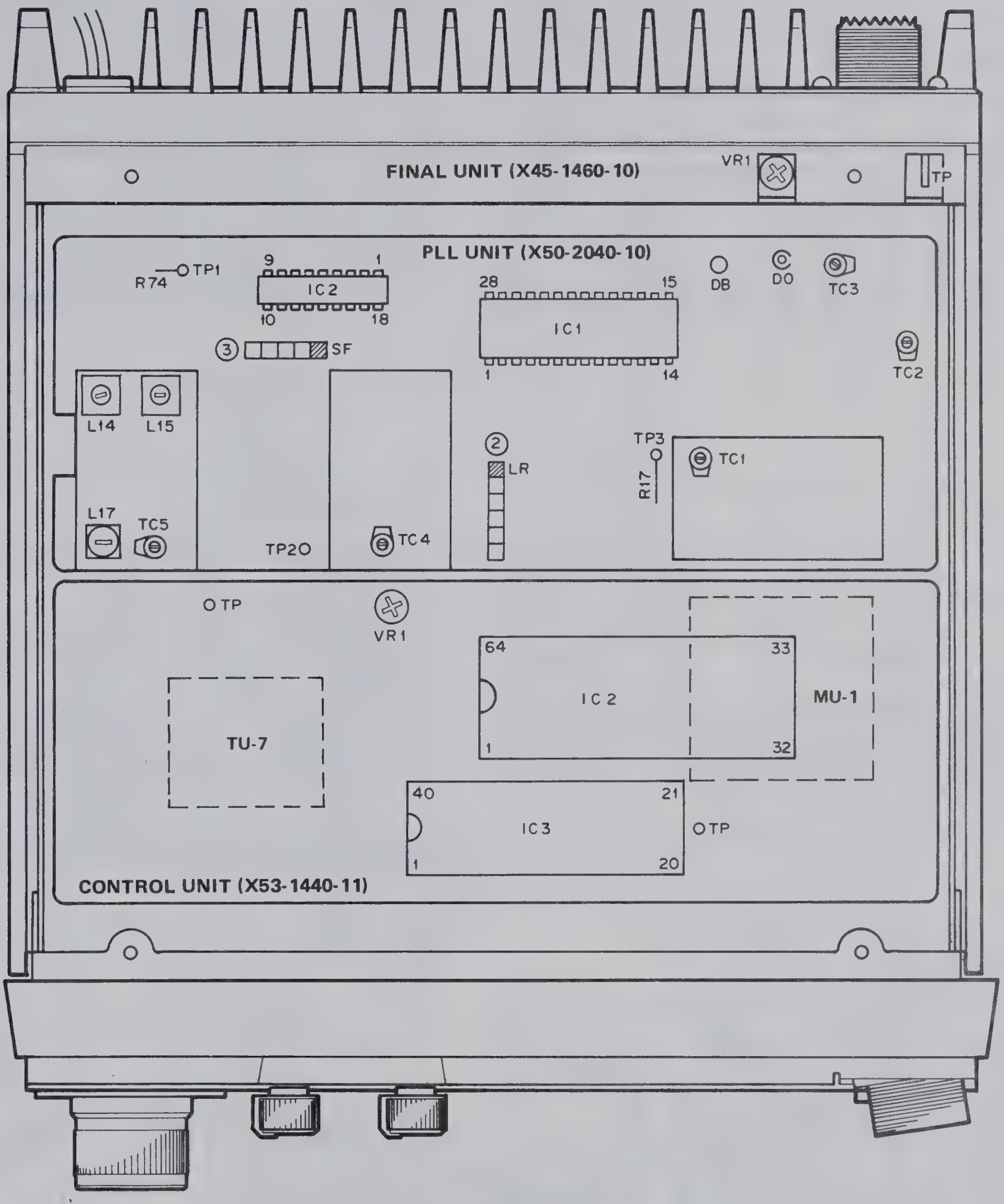
Microprocessor operation check

Item	Condition	Operation check
1. Keyboard	1) SQL : MIN (CCW) ↶ Power SW : ON Reset microprocessor. (See ADJ of "RESET".)	$\boxed{S}$ 0.000 1
	2) KEY : 5. 6. 7. 8. 9. PS. L0	Display does not change. $\boxed{S}$ 0.000 1
	3) KEY : 2. 2. 2. 2.	Tone sounds. $\boxed{S}$ 2.220 1

Item	Condition	Operation check
1. Keyboard	4) KEY : 3. 3. 3. 3. 4. 3. 3. 3.	$\boxed{S}$ 3.330 1 $\boxed{-}$ 4.330 1
	5) KEY : 4. 4. 4. 4.	$\boxed{-}$ 4.440 1
	6) KEY : 4. 5. 5. 5.	$\boxed{-}$ 4.555 1

ADJUSTMENT

BOTTOM VIEW



FINAL UNIT

VR1 : NULL POINT

PLL UNIT

TC1 : TX VCO (2.0V)
TC4 : RX VCO (6.0V)
L14,15 : PLL IF
L17 : 135.305MHz adj.

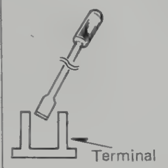
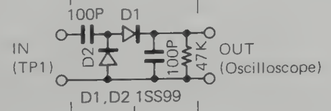
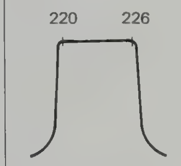
CONTROL UNIT

VR1 : SCAN SPEED

ADJUSTMENT

RX ADJUSTMENT

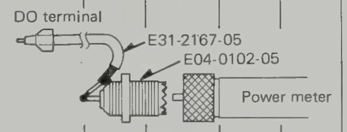
NOTE : COMP = COMPOUND UNIT (X60-1290-10)

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reset	1) Set the power SW on, while depressing PS key. Then, release the PS key.	Display						Tone sounds. Display shown 0000 1
	2) When the lithium battery is replaced, the microprocessor must be reset. Set the power SW on, while depressing PS key and terminal shorted (near Q6 position) on CONTROL unit by driver, etc. Then, release the PS key.							
2. Voltage check	1) Power supply : 13.8V DC SQL VR ↺ MIN (fully CCW)	DC VM	COMP.	8R		JP18		7.8V–8.6V
				8C		⑦-1		7.8V–8.6V
				6C		⑩-1		5.6V–6.4V
				8T		⑪-4		0.3V or less
	2) Transmit.			8T				7.8V–8.6V
				8R		JP18		0.3V or less
			PLL	DB				7V–13.5V
3. PLL	1) IF level Display : 4.995	SCOPE (10 : 1 probe)	PLL	TP1 (R74)	PLL	L14, L15	MAX When PLL leep is unlocked, ADJ TC4.	2.0Vp-p or more.
	2) RX VCO (RX) Display : 0.000	DC V.M		TP2 (C55)		TC4	6.5V	±0.1V
	3) TX VCO Display : 0.000			TP3 (R17) (collector Q5)		TC1	2.0V When PLL loop is unlocked, ADJ TC1.	(1.5V–2.9V)
	4) Receive Display : 4.995			TP2 (C55)				3.5V–5.0V Confirm.
	5) Transmit Display : 4.995			TP3 (R17)				4.5V–5.5V Confirm.
	6) HET. Frequency Receive Display : 3.000	f.counter		LR (② -6)		L17	202.065MHz	±100Hz
4 Helical	1) Connect the sweep gen. to ANT terminal. Output : 10dBμ Disconnect the No. ③ connector (SF, GND).	Detctor SCOPE	COMP.	TP1	COMP.	L1, L2, L4	Adjust to obtain the waveform as right fig.  100P D1 IN (TP1) D2 100P 47K OUT (Oscilloscope) D1, D2 1SS99	
5. SF level		RF V.M	COMP.	SF	COMP.	L6	MAX	0.2V or more
6 GAIN	1) Display . 2.560 ANT : SSG Output : 5dBμ MOD. : 1kHz DEV. 3kHz f : 222.560MHz	DC V.M (3.0V range)	COMP.	JP17	COMP.	L5, L7, L9, L15	Minimum voltage reading. Repeat 2 or 3 times. Then, minimum voltage reading with L7,9.	Ref. 4.5V
7. IF TRAP Coil (179.75MHz)	1) Display : 1.620 ANT : SSG Output : 80dBμ MOD/DIN : OFF f : 179.75MHz	AF V.M	Rear panel	SP.	COMP.	TC1	MIN.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
8. DISCRI S/N	1) ANT 2.560 ANT SSG MOD. : 1kHz, DEV. 3kHz Output : 60dBμ	AF V.M	Rear panel	SP	COMP.	L17	MAX	
	2) ANT SSG Output : –6dBμ (220.00–224.995MHz)							12dB SINAD or more.
9. S-Meter	1) MOD. 1kHz : DEV. 3kHz 2.560 SSG output : 16dBμ	S-LCD	Front panel		COMP.	VR6	S-LCD should light.	
10. Vacant CH level	1) SSG output : –8dBμ MOD/DEV. OFF Short both TP3 terminals.				COMP.	VR3	Adjust threshold point.	
11. SQ SEN.	1) Threshold point : no signal		Front panel	SQL VR			Audio noise will disappear. C.TUNE indicator off.	8 : 30 – 12 : 00
	2) SSG output : –12dBμ						C.TUNE indicator lights.	SQ open.

TX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. DRIVE	1) Transmit. Display : 3,000 Disconnect the coax. cable from the DO terminal in the COMP. unit. Connect the power meter to the DO terminal in the COMP. unit.	POWER (3W) 	PLL	DO	PLL	TC2,3	MAX	0.25–0.45W
2. POWER	1) Connect the coax. cable from the DO terminal in the COMP. unit. Display : 2.230	P.M Ammeter in the DC power supply.	Rear panel	ANT	FINAL	VR3	28W ADJ. RF LCD	28W±0.5W 6.5A or less All RF-LED's should light.
	2) 0.000–4.995							24–33W or less 6.5A or less.
3. LOW POWER	1) HI/LOW SW : LOW Display : 2.230	Power meter		ANT	FINAL	VR4	5W ADJ.	5W±0.5W
4. RF METER	1) Confirm, then, HI/LOW SW : HI	RF-LCD			COMP.	VR4	Adjust 5 LED's reading.	
5–1 PROTECTION (null)	1) FINAL unit				FINAL	VR2	MAX	
	2) Display : 2.230 Transmit.							
		Power meter	Rear panel	ANT				
		DC multimeter	FINAL	TP	FINAL	VR1	MIN	0.6V or less.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5–2. PROTECTION (Current)	1) ANT : Open	DC supply V.M			FINAL	VR2	3A ADJ.	6A or less
	2) After adjusted, connect the power meter							
6. MIC GAIN DEV.	1) Turn VR7 fully CCW. MIC 50mV/1kHz	Linear detector			COMP.	VR5	±4.5kHz ADJ.	±100Hz
	2) MIC 5mV/1kHz					VR7	±3.0kHz ADJ.	±100Hz
7. FREQ. check	1) Display : 3.000	f.counter						223.000±500Hz
8. TONE	1) Install TU7 in the CONTROL Press TONE key then, turn the encoder dial to 88.5kHz transmit.	Linear detector f.counter						DEV. 0.6–0.9kHz FREQ. 88.5kHz Check output wave of linear detector output. display.
11. Touch tone	1) Transmit Press '3', '6' key at the same time.	Linear detector f.counter			COMP.	VR1	3kHz ADJ.	±0.2kHz 1471.9Hz±1%
12. SCAN	1) SCAN SW : T0 (Confirm VR1 at 12 o'clock.) SQL VR : ↺ MIN (CCW) Key board : Press "SC"				CONT.	VR1	Check scan time changed when VR1 turn.	
	2) After ADJ. Key board : Press "C"				CONT.	VR1	Centered.	

Microprocessor operation check

Item	Condition	Operation check
1. Keyboard	1) SQL : MIN (CCW) ↺ Power SW : ON Reset microprocessor. (See ADJ of "RESET".)	S 0.000 1
	2) KEY : 5. 6. 7. 8. 9. PS. L0	Display does not change. S 0.000 1
	3) KEY : 2. 2. 2. 2.	Tone sounds. S 2.220 1

Item	Condition	Operation check
1. Keyboard	4) KEY : 3. 3. 3. 3. 4. 3. 3. 3.	S 3.330 1 − 4.330 1
	5) KEY : 4. 4. 4. 4.	⊟ 4.440 1
	6) KEY : 4. 5. 5. 5.	⊟ 4.555 1

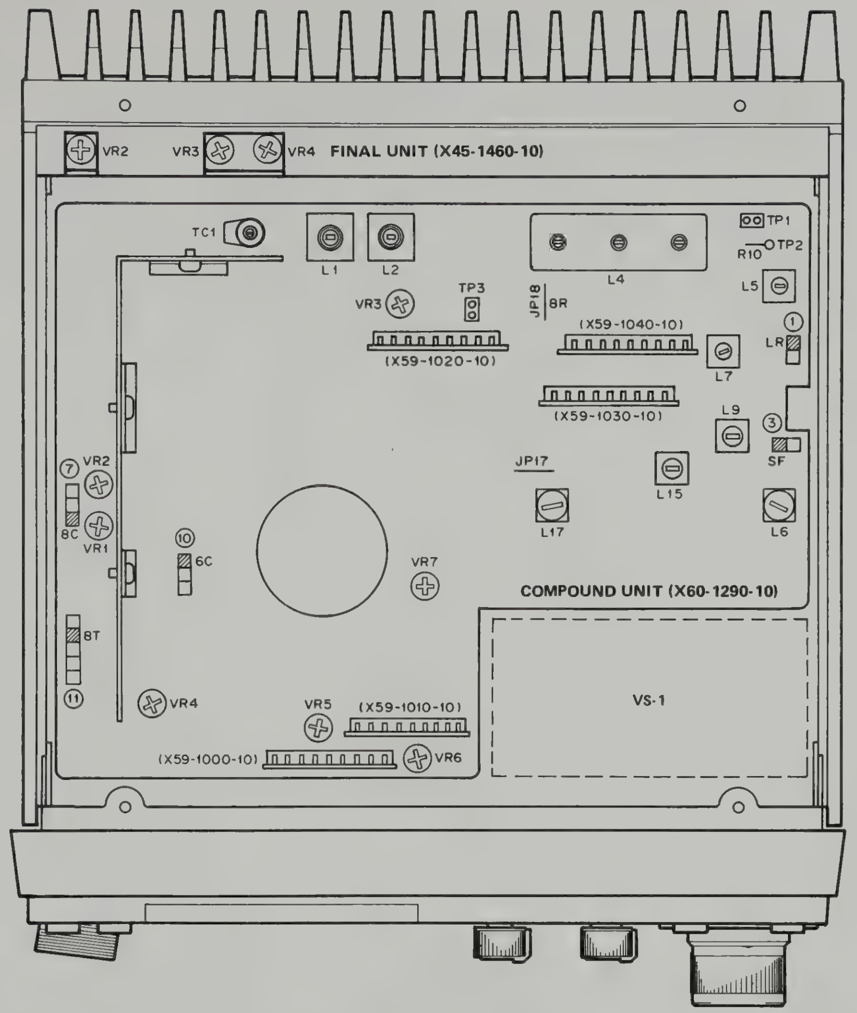
ADJUSTMENT

Item	Condition	Operation check
1. Keyboard	7) KEY : 4. 6. 6. 6.	⊟ 4.665 1
	8) KEY : 4. 7. 7. 7.	□ 4.775 1
	9) KEY : 4. 8. 8. 8.	⊟ 4.885 1
	10) KEY : 4. 9. 9. 9.	− 4.995 1
	11) KEY : 3. 0. 0. 0.	S 3.000 1
	12) KEY : OS	Tone sounds. ⊞ 3.000 1
	13) Turn the M.CH dial to CCW 1 step.	⊞ 3.000 2
	14) KEY : M	Tone sounds.
	15) Turn the M.CH dial to CCW. 2. 3. 4. . . . 19. A. b. d. U. 1. 2.	LCD Memory CH number should indicate. Tone sounds. U→1 (or 2→1)
2. M. CH SW	1) F. LOCK SW : ON	Display does not change when the M.CH dial turn to right and left. ⊞ 3.000 2
	2) M.CH key : Press	Lights on
	3) Turn the M.CH dial to the right 1 step.	Tone sounds. S 0.000 1
	4) KEY : L0	Tone sounds. S 0.000 ☆ 1
3. REV. PRIO SW	1) M.CH KEY : Press	Lights off
	2) REV SW : ON	⊞ 3.000 1 4.600 1 REV LCD : Lights on
	3) REV SW : OFF PRIO SW : ON	S 0.000 ☆ 1 REV LCD : Lights off PRIO LCD : Lights on
4. AL SW	1) PRIO SW : OFF SQL VR : MIN (CCW) AL SW : ON VOL VR : 10:00	⊞ 3.000 1 PRIO LCD : Lights off Noise should momentarily mute approx. 0.3 seconds every 6–7 seconds.

Item	Condition	Operation check
5. PS KEY	1) Turn the M.CH dial to b CH. KEY PS : ON	⊞ 3.000 b Tone sounds.
	2) AL SW : OFF PRIO SW : ON	S 0.000 b PRIO LCD : Lights on
6. SCAN KEY	1) PRIO SW : OFF KEY SC : ON	PRIO LCD : Lights off S SC 0.005 b Tone sounds. The dispaly should step up in 5kHz approx. every 6 seconds.
7. Lamp SW	1) LAMP SW : ON	Key board illuminated.
	2) OFF after checked. KEY C : ON	
8. DCL function (Digital channel link)	1) Install MU-1 in the CONT. unit.	DCL LED : Lights on.
	2) Reset microprocessor. See ADJ of "RESET".	
	3) DCL KEY : Press	
	4) Memory write to channel "A".	
	5) Digital code setting	
	● CS KEY : Press	00000
	● C.SQ KEY : Press	☆ lights.
	● RESET KEY : Press	1_00
	● CS KEY : Press again. KEY : Press 4. 9. 4. 0.	4940
	6) Check DCL operation. Set the monitor's radio. Condition : ● Display : 4.940 ● DCL KEY : Press ● CHL KEY : Press	Both radio frequency changed display to "A" channel. Tone sounds.
9. DCS System (Digital code squelch)	1) C.SQ KEY : Press	C.SQ LED's light. Squelch closed.
	2) Monitor's radio Mic PTT : Press	C.SQ LED's light off Noise heard from SP.
10. VS-1 check	1) Install the VS-1 in the CONT. unit. VOICE KEY : Press	Speaks during display's condition. Confirm.
11. PHONE function	1) PHONE KEY : Press	Display shows A1–A15.
	2) Turn to encoder dial.	
	3) Set "A1" display PS KEY : Press	
	4) Input 7 digit for telephone number (ex. 6399000)	☎ Telephone indicator light on.
	5) PHONE KEY : Press again	
	6) PHONE KEY : Press during transmit	Dial tone 7 digits are transmit automatically.
	7) Return to receive mode. PHONE KEY : Press again	
	8) C KEY : Press	A––
	9) PHONE KEY : Press	☎ Telephone indicator light off.

ADJUSTMENT

TOP VIEW



COMPOUND UNIT

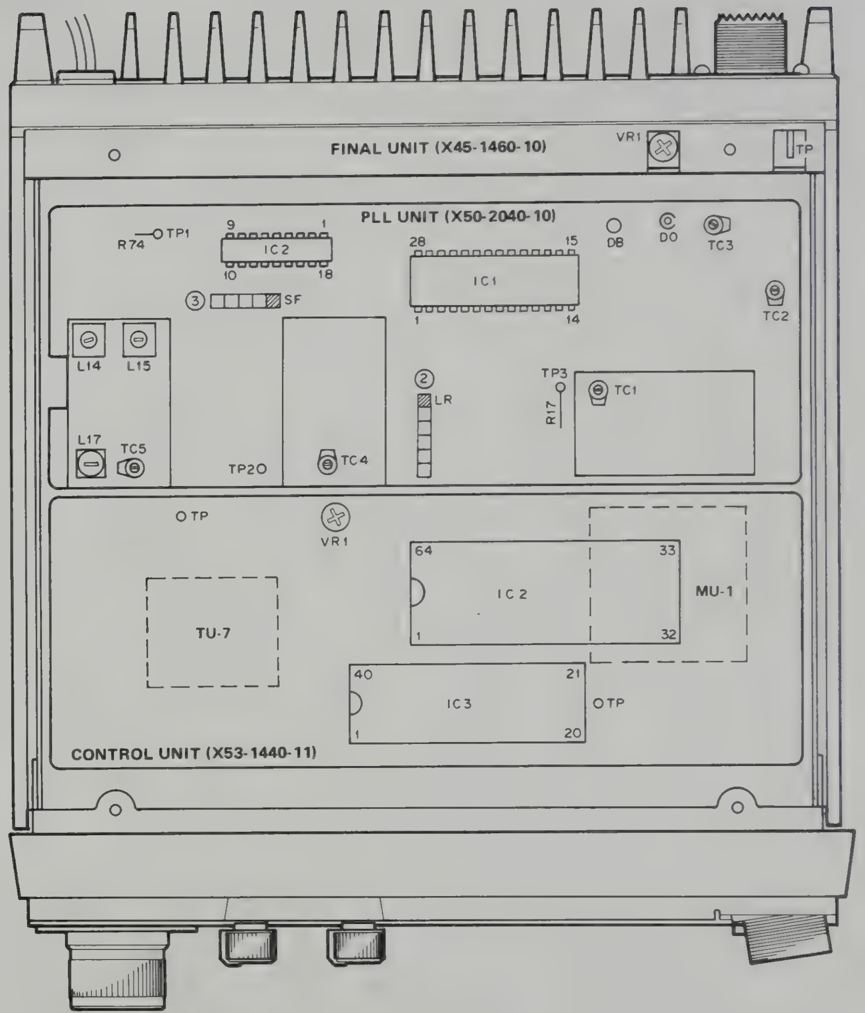
L5,7,9,15 : IF GAIN adj.
VR1 : TOUCH TONE adj.
VR2 : BEEP LEVEL adj.
VR3 : VACANT CH. LEVEL adj.
VR4 : RF-METER adj.
VR5 : DEV. adj. ±4.5kHz
VR6 : S-METER adj.
VR7 : MIC GAIN adj. ±3kHz

FINAL UNIT

VR2 : Protection current
VR3 : High power
VR4 : Low power

ADJUSTMENT

BOTTOM VIEW



FINAL UNIT

VR1 : NULL POINT

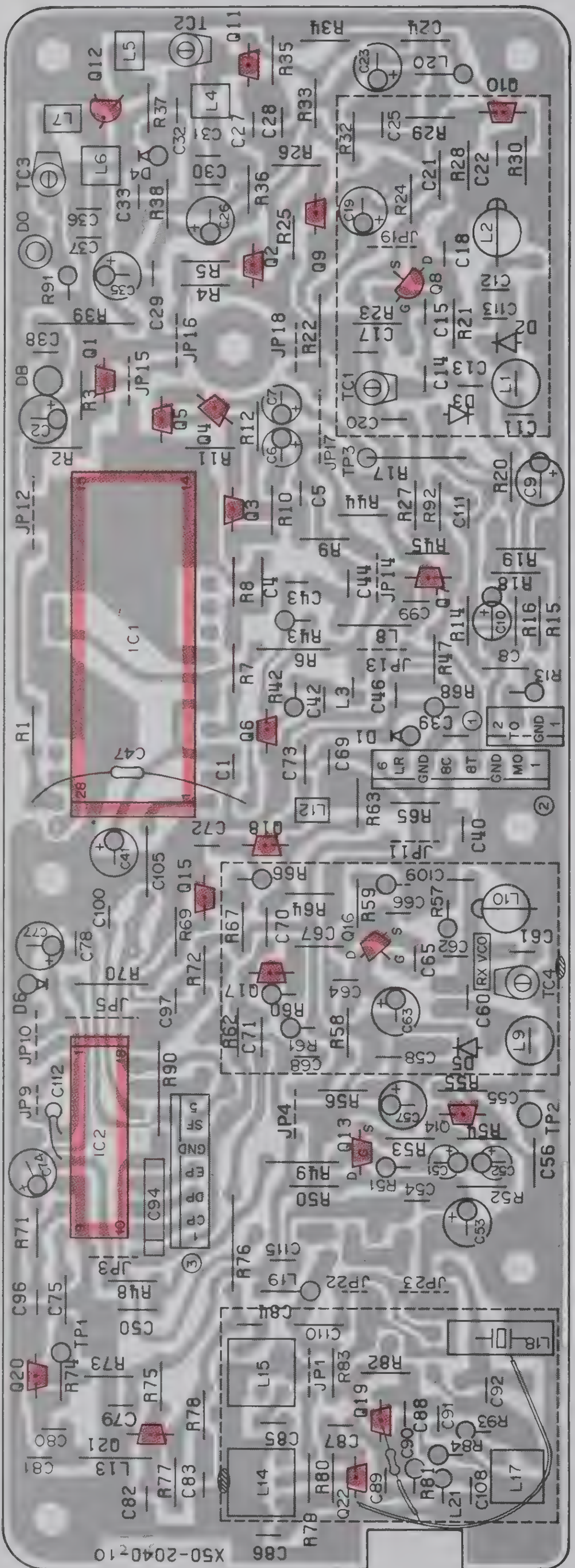
PLL UNIT

TC1 : TX VCO (2.0V)
TC4 : RX VCO (6.0V)
L14,15 : PLL IF
L17 : 135.305MHz adj.

CONTROL UNIT

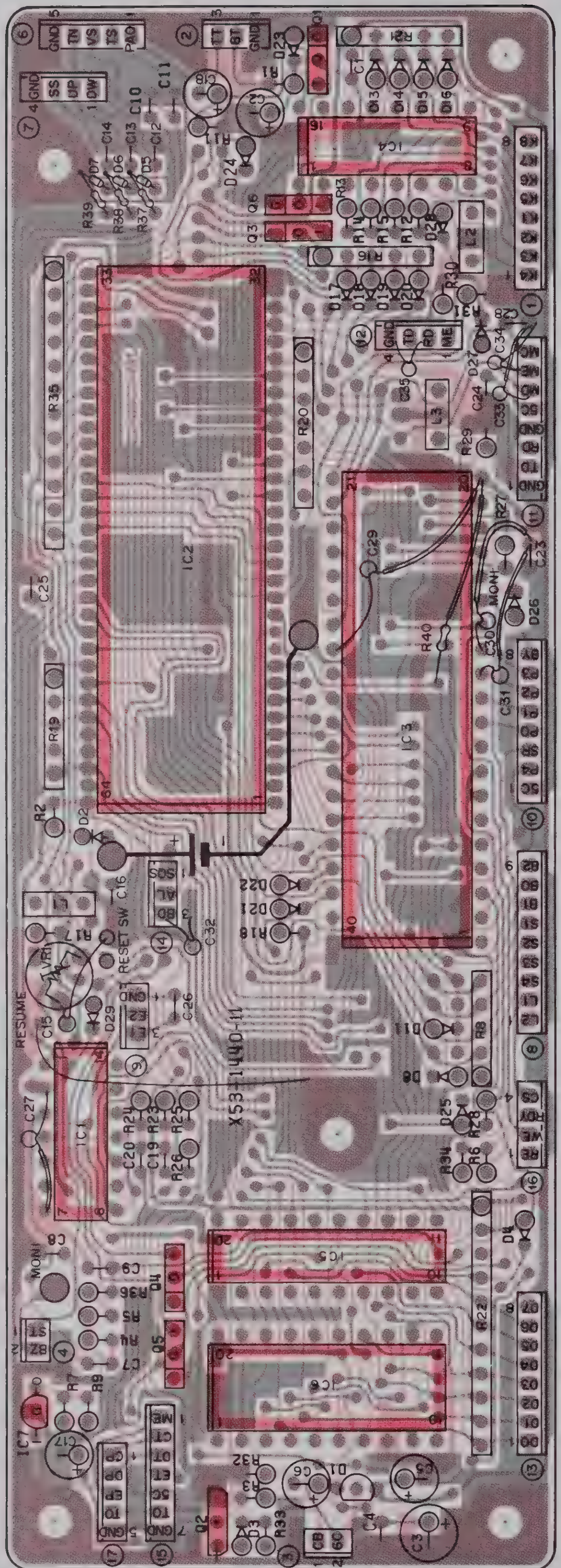
VR1 : SCAN SPEED

PLL UNIT (X50-2040-10) Component side view



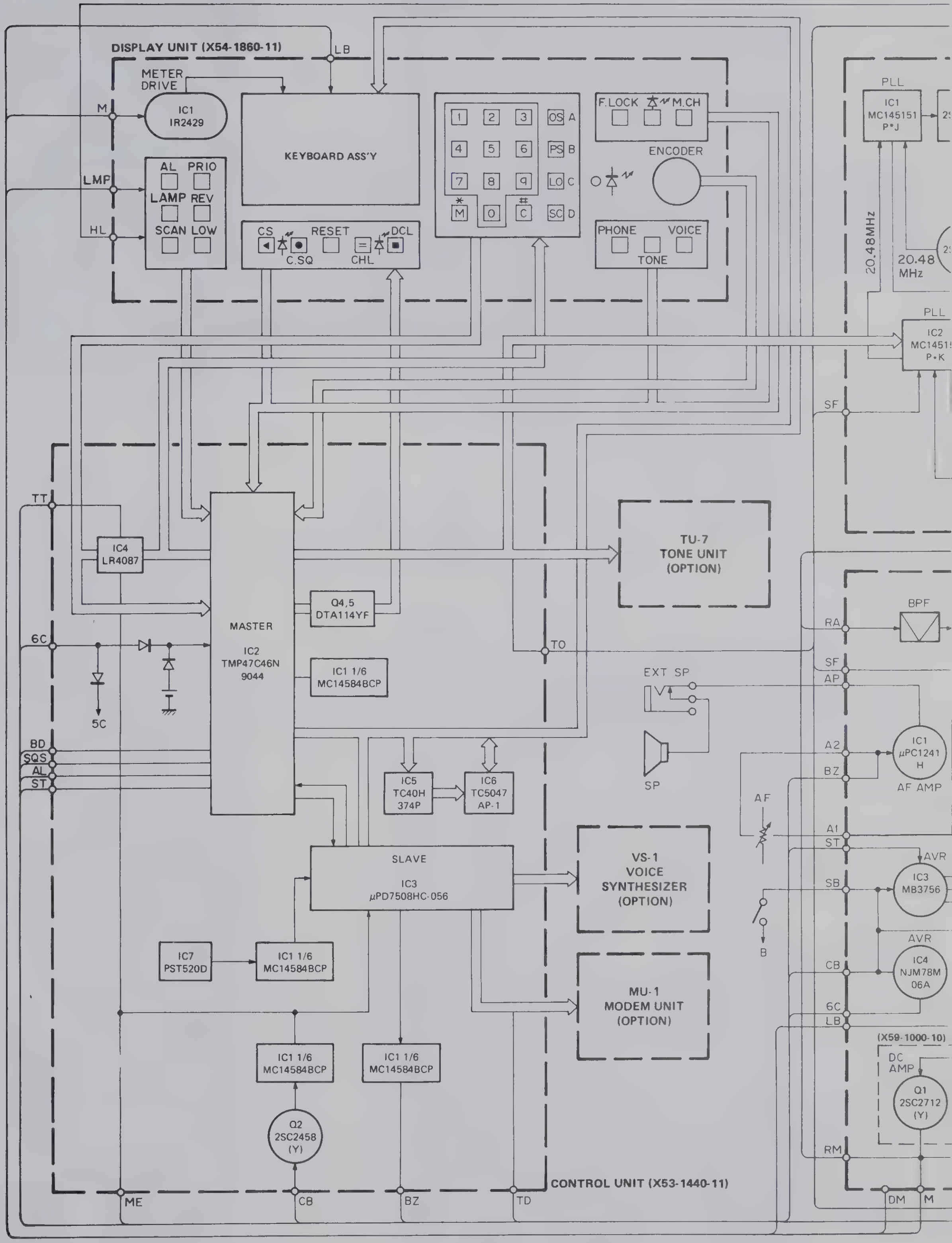
Q1,9,14,15 : 2SC2458(Y) Q2 : 2SA1047(Y) Q3–5 : 2SC1775(E) Q6,7,10,17,18,20–22 : 2SC2668(Y) Q8,16 : 2SK125 Q11 : 2SC2347
Q12 : 2SC2407(I) Q13 : 2SK30A(O) Q19 : 2SC2787(L)
IC1 : MC145151P*J IC2 : MC145155P*K
D1,4 : 1S1555 D2,3,5 : 1S2208 D6 : MTZ6.2JA

CONTROL UNIT (X53-1440-11) Component side view



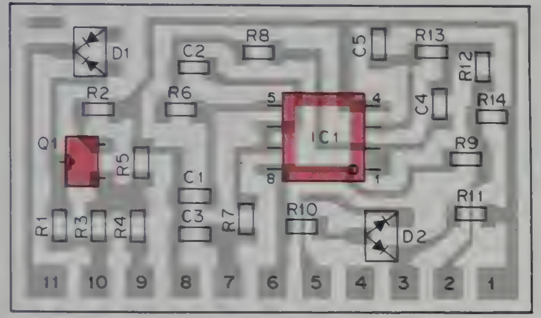
Q1 : DTC124EF Q2 : 2SC2458(Y) Q3–5 : DTA114YF Q6 : DTC143TS
IC1 : MC14584BCP IC2 : TMP47C46N-9044 IC3 : µPD7508HC-056 IC4 : LR4087 IC5 : TC40H374P IC6 : TC5047AP-1 IC7 : PST520D
D1 : MC811 D2,4–8,11,13–22,24,27,28 : 1S1555 or 1N4448 D3 : MTZ7.5JA D23 : MTZ5.6JC D25,26 : 1SS106 D29 : 1S133

BLOCK D


DISPLAY UNIT (X54-1860-11)
LB
METER DRIVE
M
IC1 IR2429
KEYBOARD ASS'Y
LMP
AL
PRIO
LAMP
REV
HL
SCAN
LOW
CS
RESET
DCL
C.SQ
CHL
1
2
3
OS
A
4
5
6
PS
B
7
8
9
LO
C
M
0
C
SC
D
F.LOCK
M.CH
ENCODER
PHONE
VOICE
TONE
PLL
IC1 MC145151 P*J
20.48MHz
20.48 MHz
PLL
IC2
P•K
SF
TT
IC4 LR4087
MASTER
IC2 TMP47C46N 9044
Q4,5 DTA114YF
IC1 1/6 MC14584BCP
TU-7 TONE UNIT (OPTION)
6C
5C
TO
EXT SP
SP
BD
SQS
AL
ST
IC5 TC40H 374P
IC6 TC5047 AP-1
SLAVE
IC3 μPD7508HC-056
VS-1 VOICE SYNTHESIZER (OPTION)
IC7 PST520D
IC1 1/6 MC14584BCP
MU-1 MODEM UNIT (OPTION)
IC1 1/6 MC14584BCP
IC1 1/6 MC14584BCP
Q2 2SC2458 (Y)
CONTROL UNIT (X53-1440-11)
ME
CB
BZ
TD
RA
BPF
SF
AP
A2
IC1 μPC1241 H
AF AMP
BZ
AF
A1
ST
AVR
SB
IC3 MB3756
B
AVR
CB
IC4 NJM78M 06A
6C
LB
(X59-1000-10)
DC AMP
Q1 2SC2712 (Y)
RM
DM
M

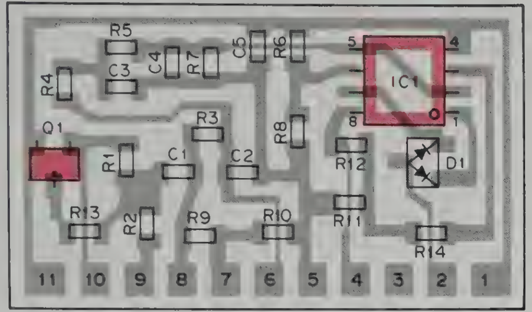
TM-3530A PC BOARD VIEWS

MIC AMP MODULE UNIT (X59-1000-10)
Component side view



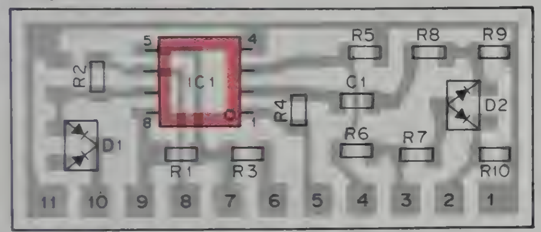
Q1 : 2SC2712(Y) IC1 : NJM4558M
D1 : 1SS184 D2 . 1SS181

CENTER-DETECTOR UNIT (X59-1030-10)
Component side view



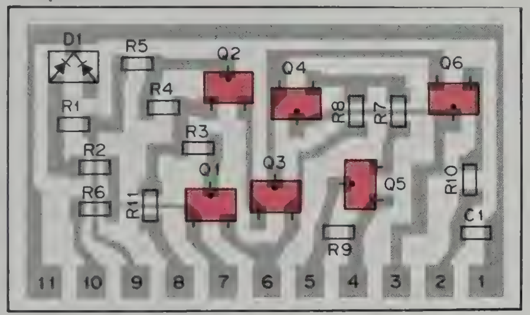
Q1 : 2SC2714(Y) IC1 : NJM4558M
D1 : 1SS181

MIC AMP, S-METER UNIT (X59-1010-10)
Component side view



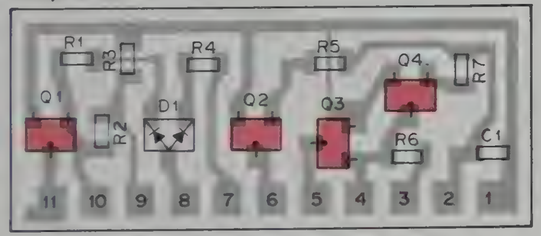
IC1 : NJM4558M
D1 : 1SS184 D2 : 1SS181

SQUELCH CONTROL UNIT (X59-1040-10)
Component side view

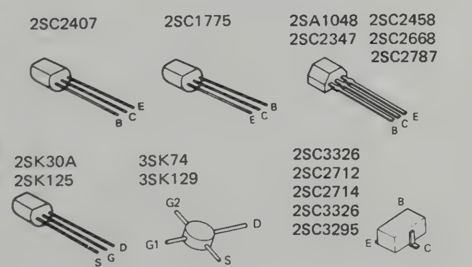


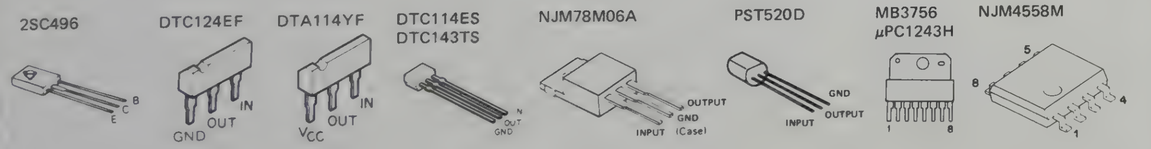
Q1,5 : 2SC2712(K) Q2,3 : 2SC3295(B) Q4,6 : 2SC2712(BL)
D1 : 1SS184

ALERT, VACANT-CH UNIT (X59-1020-10)
Component side view

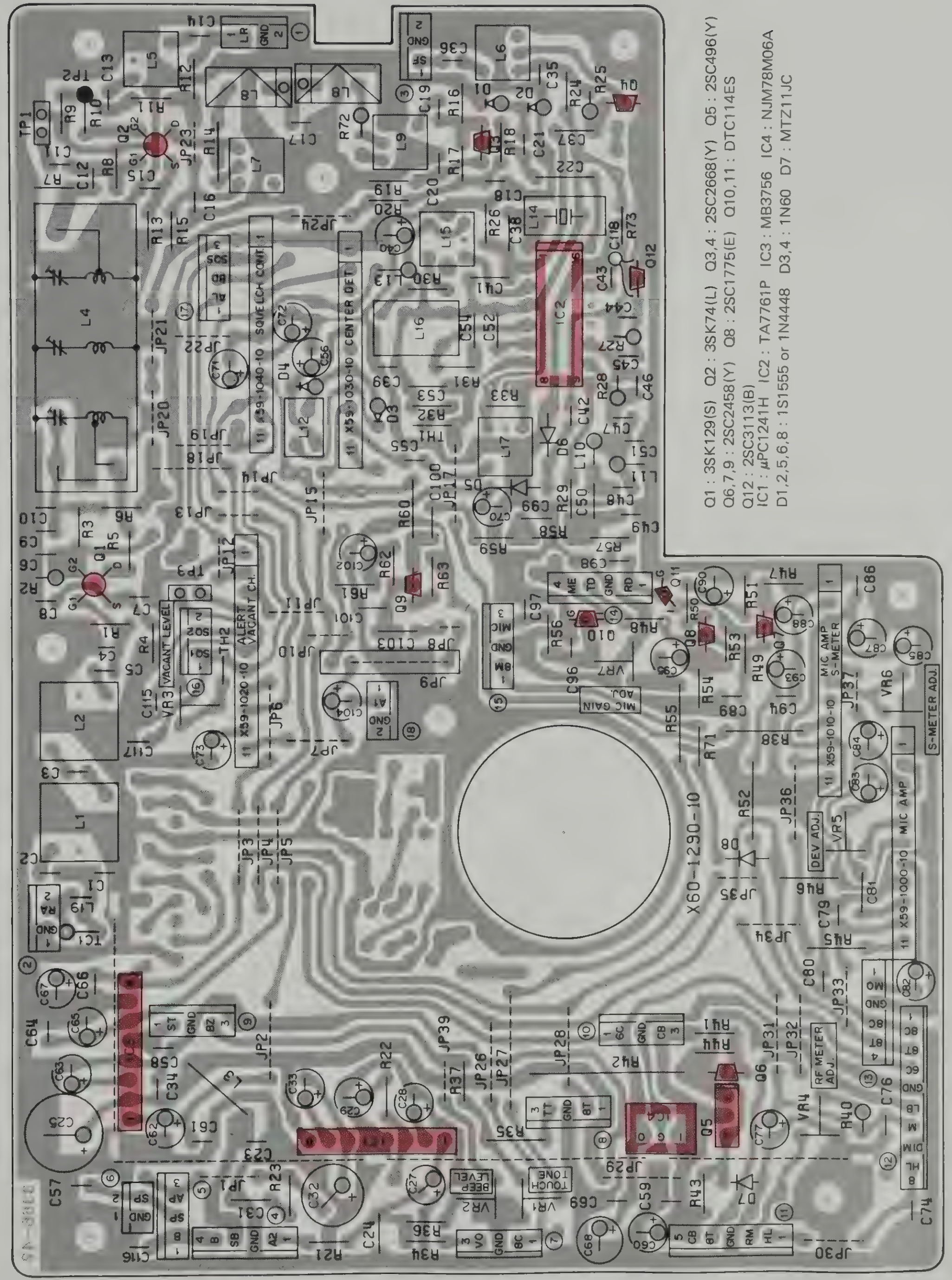


Q1 : 2SC3326(A) Q2 –4 : 2SC2712(Y)
D1 : 1SS181



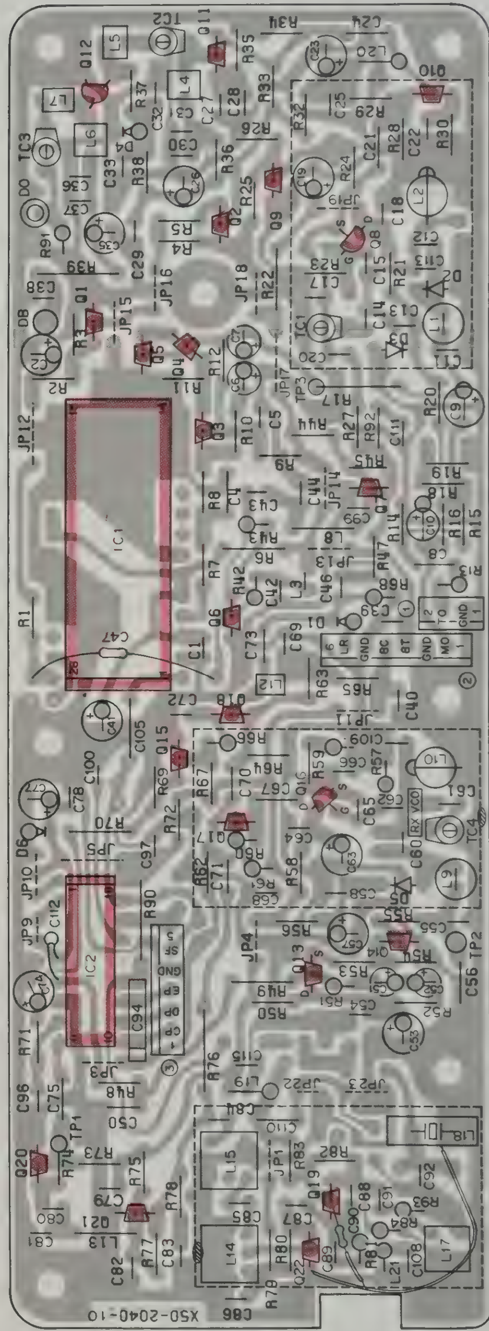


COMPOUND UNIT (X60-1290-10) Component side view



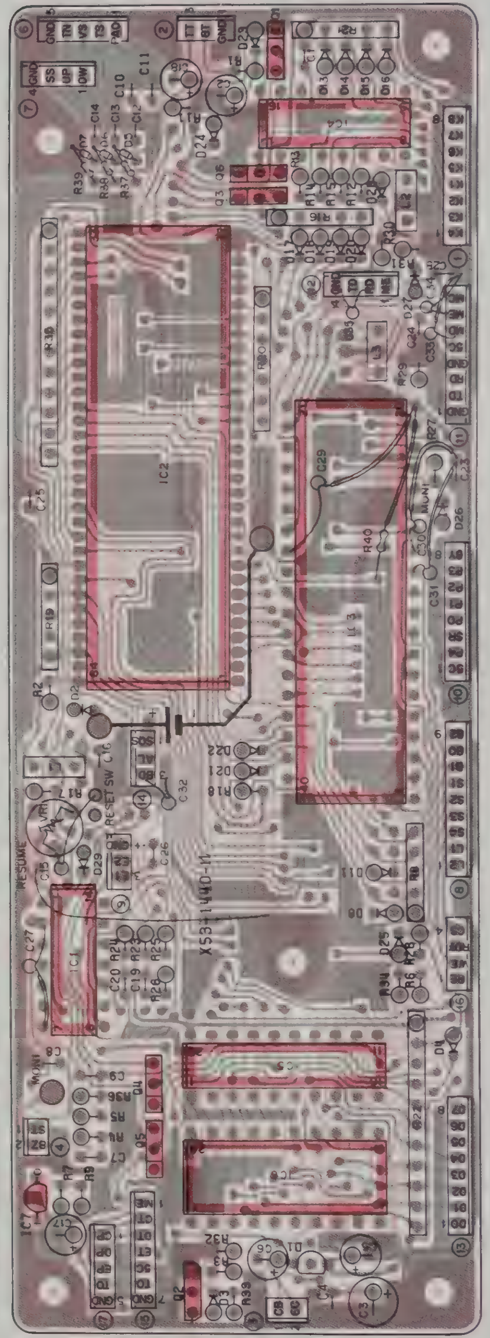
Q1 : 3SK129(S) Q2 : 3SK74(L) Q3,4 : 2SC2668(Y) Q5 : 2SC496(Y)
Q6,7,9 : 2SC2458(Y) Q8 : 2SC1775(E) Q10,11 : DTC114ES
Q12 : 2SC3113(B)
IC1 : μPC1241H IC2 : TA7761P IC3 : MB3756 IC4 : NJM78M06A
D1,2,5,6,8 : 1S1555 or 1N4448 D3,4 : 1N60 D7 : MTZ11JC

PLL UNIT (X50-2040-10) Component side view



Q1,9,14,15 : 2SC2458(Y) Q2 : 2SA1047(Y) Q3–5 : 2SC1775(E) Q6,7,10,17,18,20–22 : 2SC2668(Y) Q8,16 : 2SK125 Q11 : 2SC2347
Q12 . 2SC2407(I) Q13 : 2SK30A(O) Q19 . 2SC2787(L)
IC1 . MC145151P*J IC2 . MC145155P*K
D1,4 : 1S1555 D2,3,5 . 1S2208 D6 : MTZ6.2JA

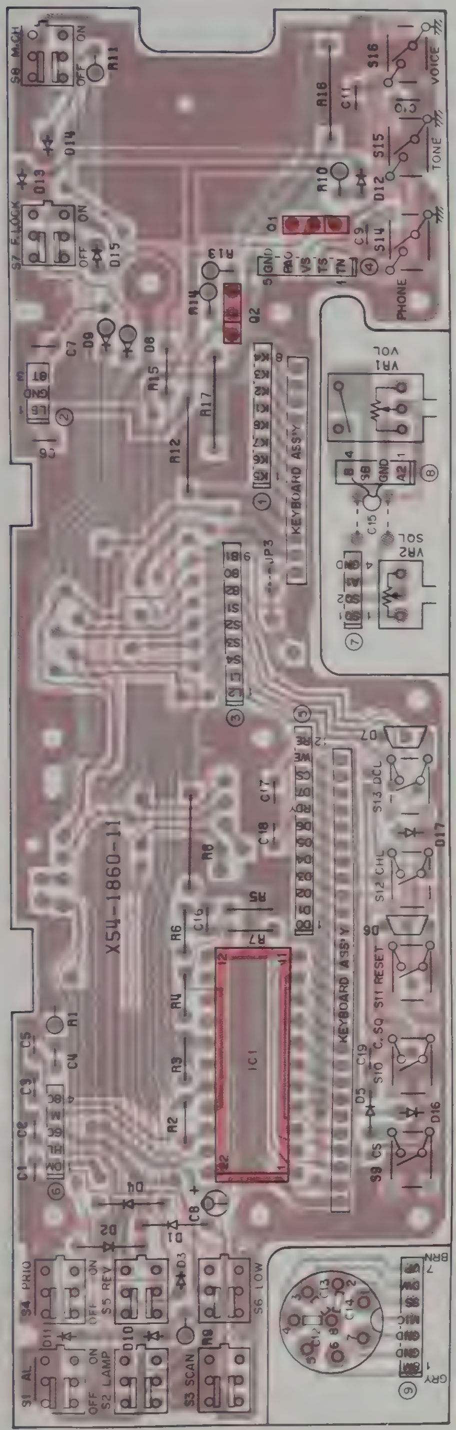
CONTROL UNIT (X53-1440-11) Component side view



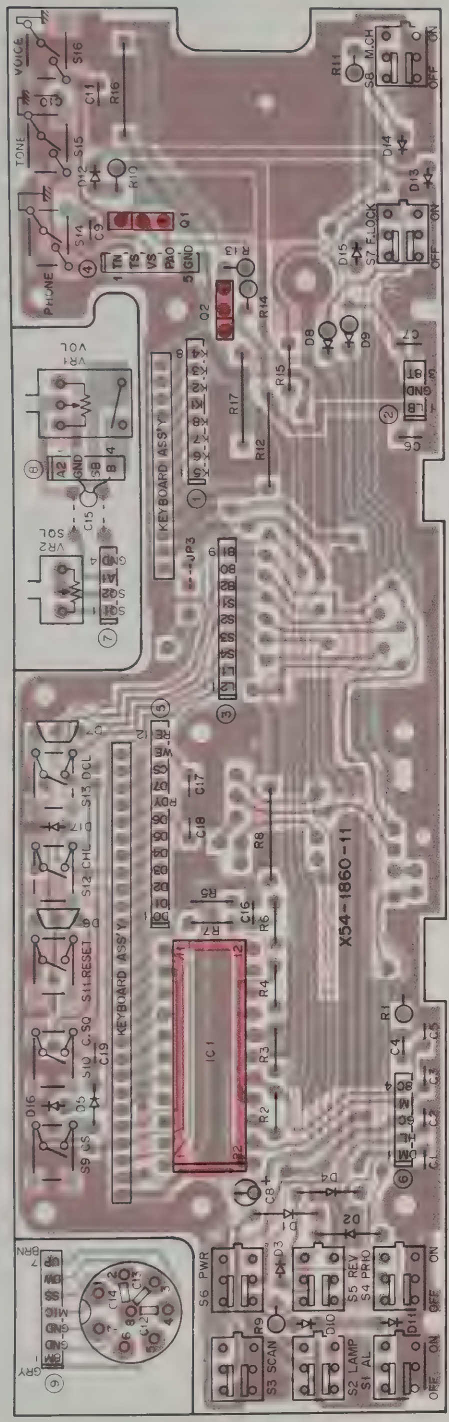
Q1 : DTC124EF Q2 : 2SC2458(Y) Q3–5 : DTA114YF Q6 · DTC143TS
IC1 : MC14584BCP IC2 : TMP47C46N-9044 IC3 : μPD7508HC-056 IC4 : LR4087 IC5 : TC40H374P IC6 : TC5047AP-1 IC7 : PST520D
D1 : MC811 D2,4–8,11,13–22,24,27,28 : 1S1555 or 1N4448 D3 : MTZ7.5JA D23 : MTZ5.6JC D25,26 : 1SS106 D29 : 1S133

PC BOARD VIEWS/TERMINAL FUNCTION TM-3530A

DISPLAY UNIT (X54-1860-11) Component side view

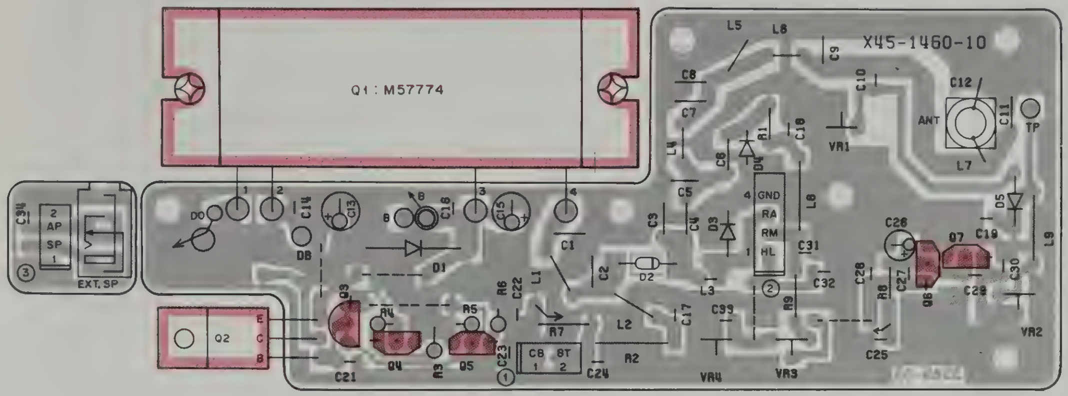


DISPLAY UNIT (X54-1860-11) Foil side view



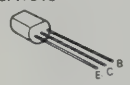
Q1 : DTC124EF Q2 : 2SA790(A,B)
IC1 : IR2429
D1–5,8,9 : 1S1555 or 1N4448 D6,7 : MC921 D10–13 : LN38GPL D14 : LN222RP D15 : LN322GP D16,17 : LN442YP

FINAL UNIT (X45-1460-10) Component side view

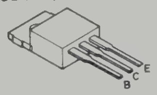


Q1 : M57774 Q2 : 2SD1406(Y) Q3 : 2SA1015(Y) Q4–7 : 2SC2458(Y)
D1 : U15B D2 : MI407 D3 : MI308 D4,5 : 1S1587

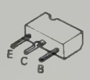
2SA1015



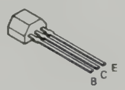
2SD1406



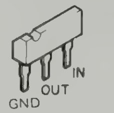
2SA790



2SC2458



DTC124EF



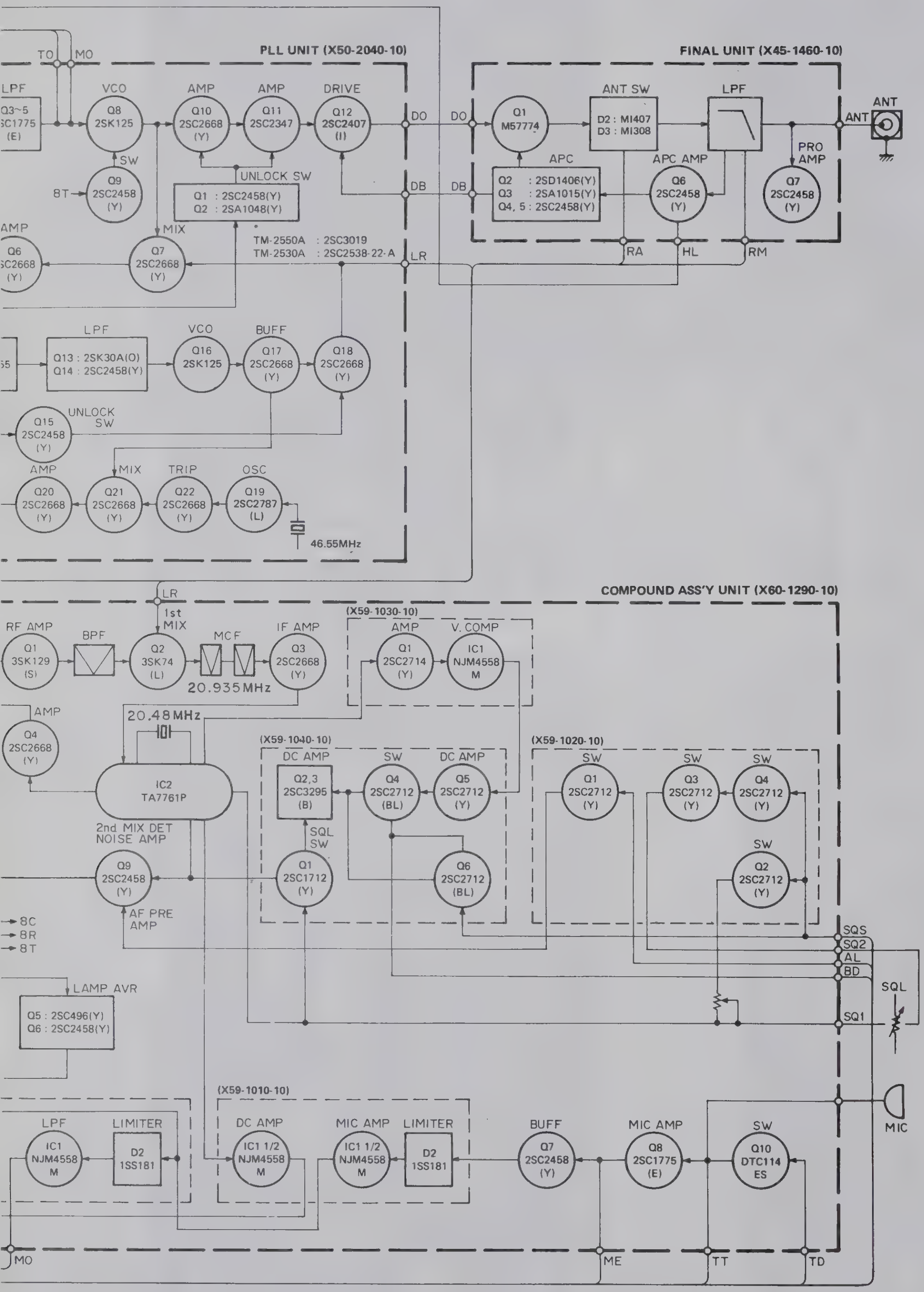
TERMINAL FUNCTION

Terminal name	Terminal function
AL	ALERT
AP	Audio Power Output
A1	AF Output
A2	AF Input
B	+ 13.8V
BD	Busy Display
BZ	Buzzer
CB	Common + B
CT	Tone Clock
CP	PLL Clock
5C	+ 5V Common
6C	+ 6V Common
8C	+ 8V Common
DB	Drive + B
DT	Tone Data
DW	MIC Down SW
DP	PLL Data
DM	Dimmer
DO	Drive Out
ET	Tone Enable
EP	PLL Enable
E1	Encoder 1
E2	Encoder 2
HL	HI/LOW
G	GND
LB	Lamp + B
LR	RX Local

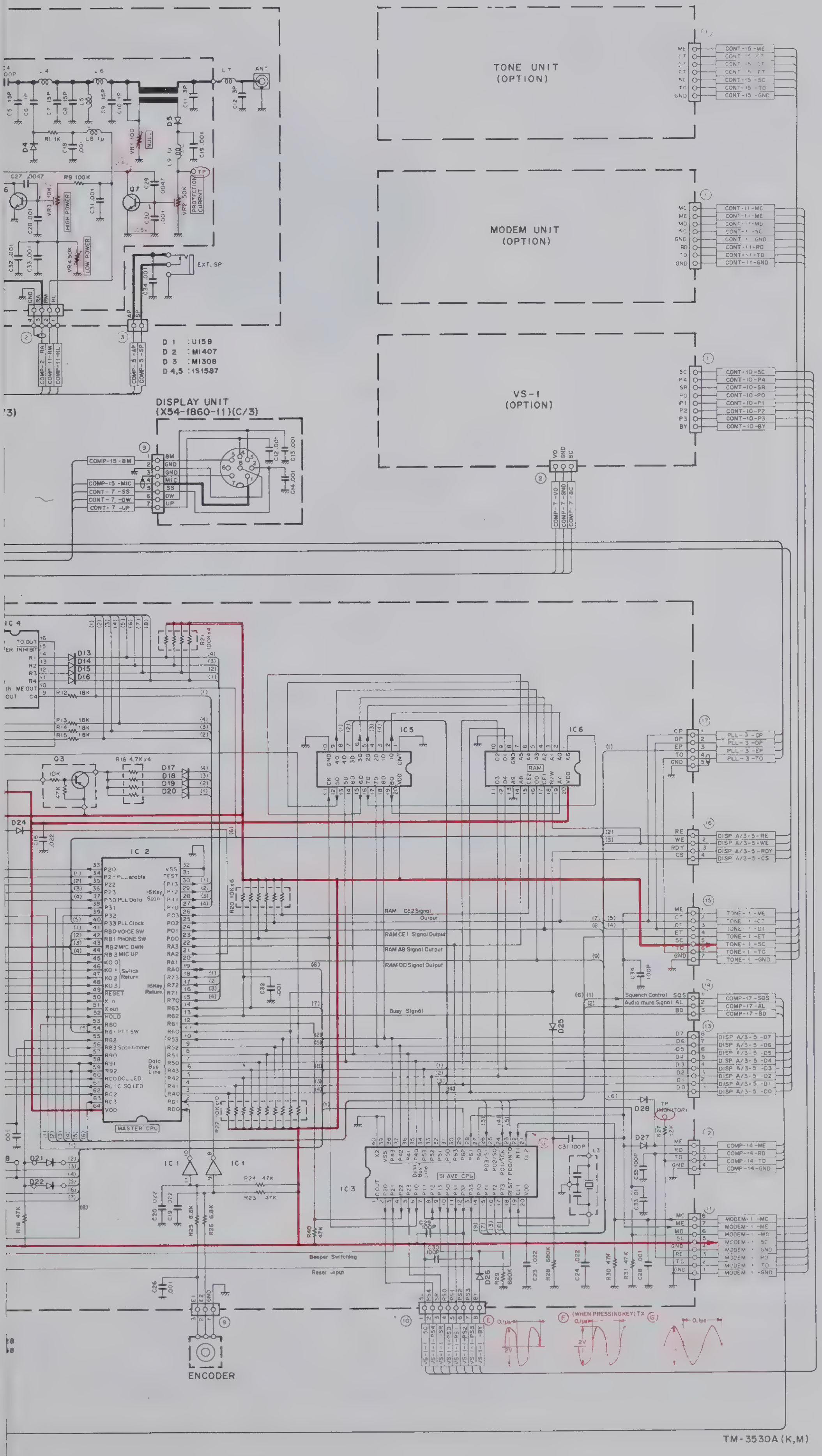
Terminal name	Terminal function
ME	Modem Enable
MD	Modem Data
MC	Modem Clock
M	Meter
MIC	MIC
MO	Modulator Out
8M	MIC 8V
NC	Non Connection
RD	RX Data
RA	RX Antenna
RM	RF Meter
SF	Standard Frequency
ST	Stand By
SS	Stand By SW
SQS	Squelch Select
SQ1	Squelch 1
SQ2	Squelch 2
SP	Speaker
SB	Switched + B
TO	Tone
TS	Tone SW
TH	Tone Hi
TD	TX Data
TT	Touch Tone Signal
8T	TX + 8V
8C	+ 8V Common
UP	MIC UP SW
VS	Voice SW

TM-3530A

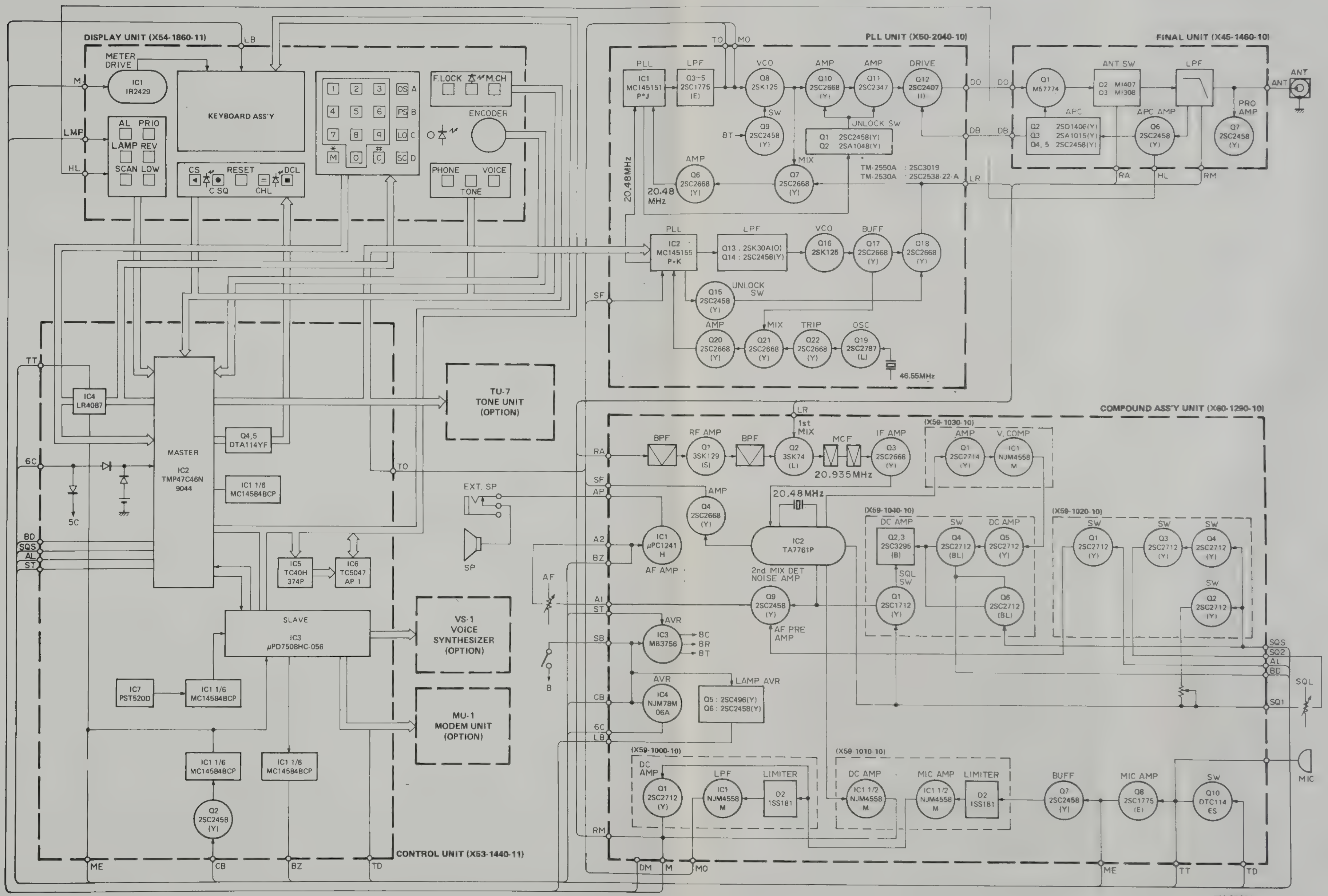
DIAGRAM



SCHEMATIC DIAGRAM TM-3530A



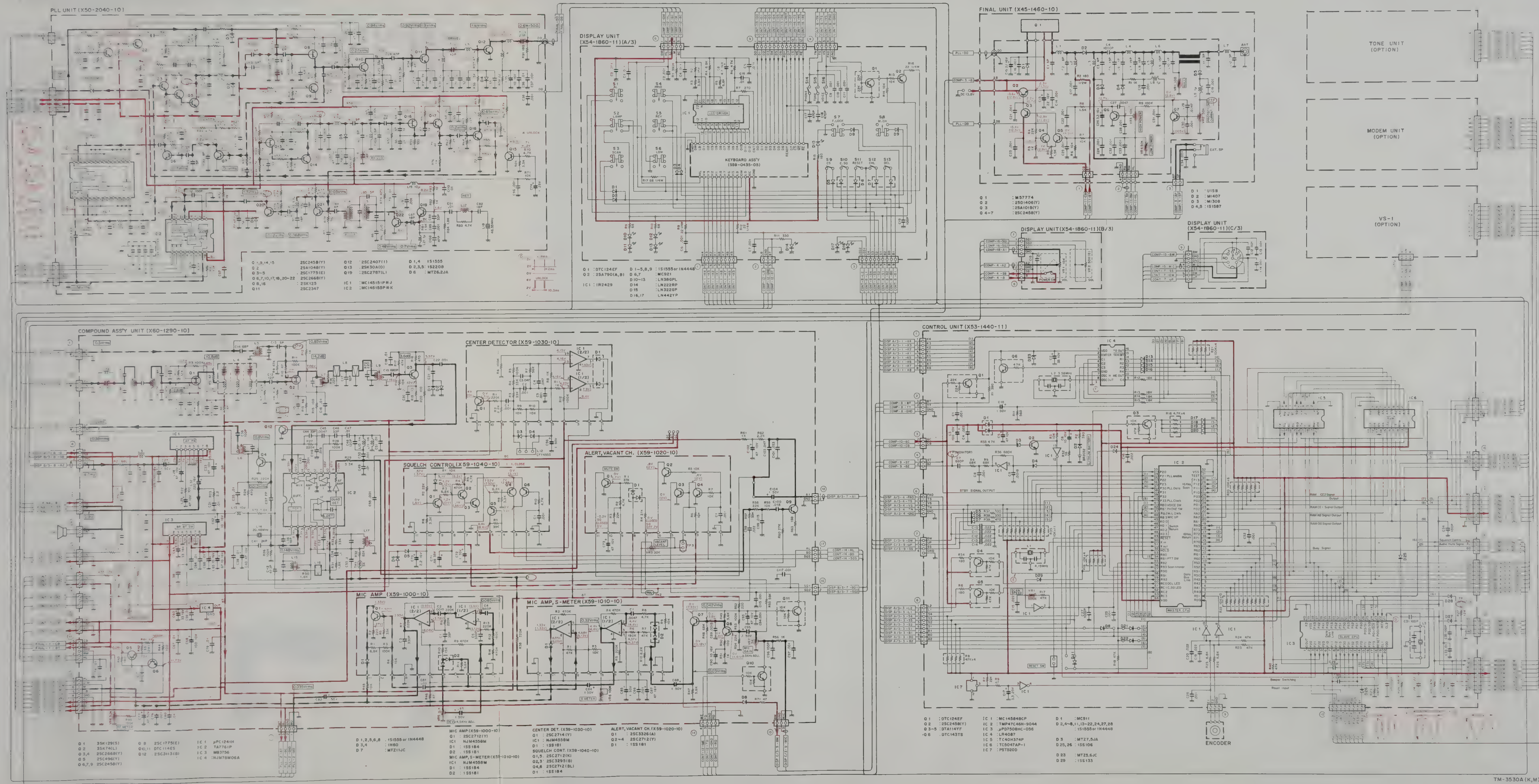
BLOCK DIAGRAM



TM-3530A

SCHEMATIC DIAGRAM TM-3530A

Signal line — Control line — Common DC line — 8T,8R Line — Voltage measurement conditions f =220.00MHz , RX no signal, ( ) : TX.


PLL UNIT (X50-2040-10)
DISPLAY UNIT (X54-1860-11)(A/3)
KEYBOARD ASS'Y (S59-0435-05)
FINAL UNIT (X45-1460-10)
TONE UNIT (OPTION)
MODEM UNIT (OPTION)
VS-1 (OPTION)
DISPLAY UNIT (X54-1860-11)(B/3)
DISPLAY UNIT (X54-1860-11)(C/3)
COMPOUND ASS'Y UNIT (X60-1290-10)
CENTER DETECTOR (X59-1030-10)
SQUELCH CONTROL (X59-1040-10)
ALERT, VACANT CH. (X59-1020-10)
MIC AMP (X59-1000-10)
MIC AMP, S-METER (X59-1010-10)
CONTROL UNIT (X53-1440-11)
IC 2
IC 5
IC 6
IC 7
IC 1
EXT. SP
ANT
S METER
DEV 4.5KHz ADJ.
UNLOCK
2ms
10.3ms
0.48Vrms
0.7Vrms
ENCODER

Q 1,9,14,15 2SC2458(Y)
Q 2 2SA1048(Y)
Q 3~5 2SC1775(E)
Q 6,7,10,17,18,20~22 2SC2668(Y)
Q 8,16 : 2SK125
Q 11 2SC2347
Q 12 : 2SC2407(I)
Q 13 : 2SK30A(O)
Q 19 : 2SC2787(L)
IC 1 : MC145151P※J
IC 2 : MC145155P※K
D 1,4 1S1555
D 2,3,5 : 1S2208
D 6 : MTZ6.2JA

Q 1 : DTC124EF
Q 2 : 2SA790(A,B)
IC 1 : IR2429
D 1~5,8,9 : 1S1555 or 1N4448
D 6,7 : MC921
D 10~13 : LN38GPL
D 14 : LN222RP
D 15 : LN322GP
D 16,17 LN442YP

Q 1 : M57774
Q 2 : 2SD1406(Y)
Q 3 : 2SA1015(Y)
Q 4~7 : 2SC2458(Y)
D 1 : U15B
D 2 : M1407
D 3 : M1308
D 4,5 : 1S1587

Q 1 3SK129(S)
Q 2 3SK74(L)
Q 3,4 2SC2668(Y)
Q 5 2SC496(Y)
Q 6,7,9 2SC2458(Y)
Q 8 2SC1775(E)
Q 10,11 DTC114ES
Q 12 2SC3113(B)
IC 1 μPC1241H
IC 2 TA7761P
IC 3 MB3756
IC 4 : NJM78M06A
D 1,2,5,6,8 : 1S1555 or 1N4448
D 3,4 : 1N60
D 7 : MTZ11JC

MIC AMP (X59-1000-10)
Q1 : 2SC2712(Y)
IC1 NJM4558M
D1 : 1SS184
D2 : 1SS181

MIC AMP, S-METER (X59-1010-10)
IC1 NJM4558M
D1 : 1SS184
D2 : 1SS181

CENTER DET. (X59-1030-10)
Q1 : 2SC2714(Y)
IC1 : NJM4558M
D1 : 1SS181

SQUELCH CONT. (X59-1040-10)
Q1,5 2SC2712(K)
Q2,3 2SC3295(B)
Q4,6 2SC2712(BL)
D1 : 1SS184

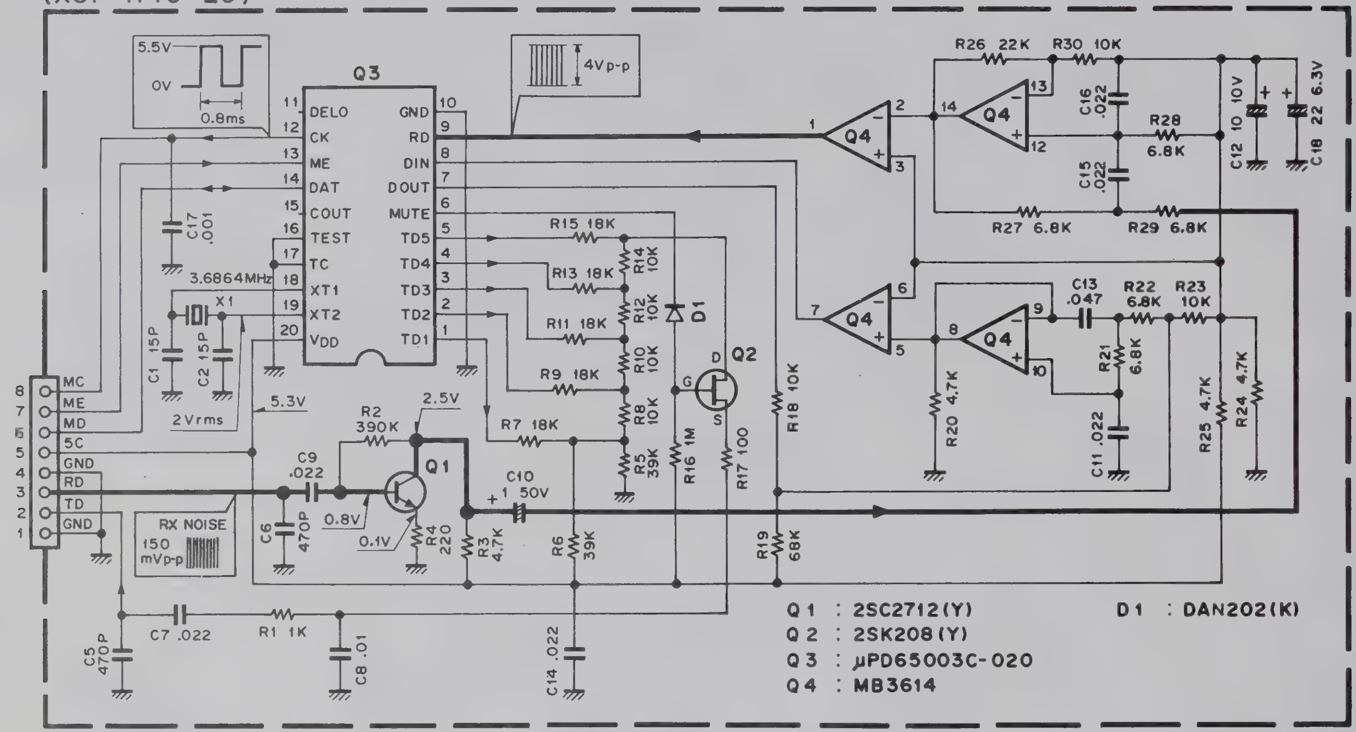
ALERT, VACANT CH. (X59-1020-10)
Q1 : 2SC3326(A)
Q2~4 2SC2712(Y)
D1 : 1SS181

Q 1 : DTC124EF
Q 2 : 2SC2458(Y)
Q 3~5 : DTA114YF
Q 6 : DTC143TS
IC 1 : MC14584BCP
IC 2 : TMP47C46N-9044
IC 3 : μPD7508HC-056
IC 4 : LR4087
IC 5 : TC40H374P
IC 6 : TC5047AP-1
IC 7 : PST520D
D 1 : MC911
D 2,4~8,11,13~22,24,27,28 : 1S1555 or 1N4448
D 3 : MTZ7.5JA
D 25, 26 : 1SS106
D 23 : MTZ5.6JC
D 29 : 1SS133

MU-1 (MODEM)/MB-10 (MOBILE MOUNT)

MU-1 SCHEMATIC DIAGRAM

(X57-1140-20)



- **Modulation output (TD terminal output on MODEM unit)**

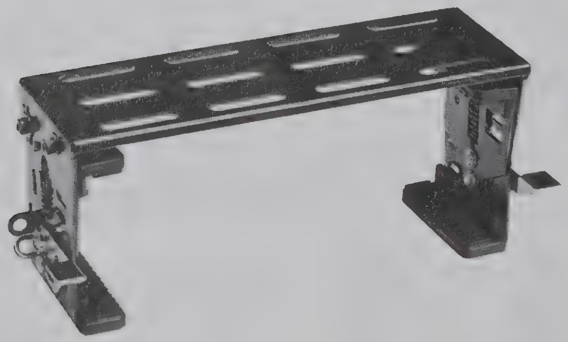
Condition		TD terminal output	
ME	MD	Frequency (Hz)	Output voltage (V)
5V	5V	1.200	1.3 ± 0.15
5V	0V	1.800	1.1 ± 0.15

- **Demodulation output**

Operation condition (RD terminal) : 40mV±3dB
(Confirm DAT terminal voltage by receiving a 60dBµ signal from SSG)

SSG MOD. frequency	DAT terminal voltage
1.200Hz	5V
1.800Hz	0V

MB-10 OUTSIDE VIEW

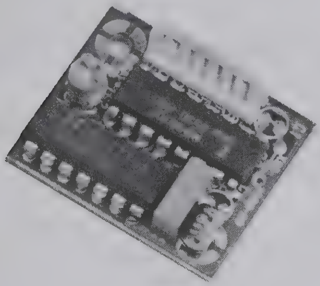


MB-10 PARTS LIST

Part No.	Re-marks	Description	Q'Ty	Ref. No.
A13-0666-02	N	Mount blacket ass'y	1	
A13-0667-02	N	Mount blacket ass'y	1	
A13-0668-04	N	Mount hardware	1	
B50-8063-00	N	Instruction manual	1	
G13-0823-04		Cushion	4	
H01-8006-03	N	Carton (Inside)	1	
H13-0803-03	N	Protective plate	1	
H13-0805-03	N	Protective plate	1	
H25-0029-04)		Protective bag (Screw etc.)	1	
H25-0036-04		Protective bag (Angle ass'y)	2	
H25-0116-04)		Protective bag (Accessary)	1	
N09-0008-04		Hex. head screw (Accessary)	4	
N09-0632-05		Taptite screw (A) (Accessary)	4	
N14-0510-04		Flange nut (Accessary)	4	
N15-1040-45		Flat washer (Accessary)	4	
N15-1060-46		Flat washer (Accessary)	4	
N16-0060-46		Spring washer (Accessary)	4	
N99-0304-04		Hex. hole screw (Accessary)	4	
W01-0401-05		Hex. wrench (Accessary)	1	

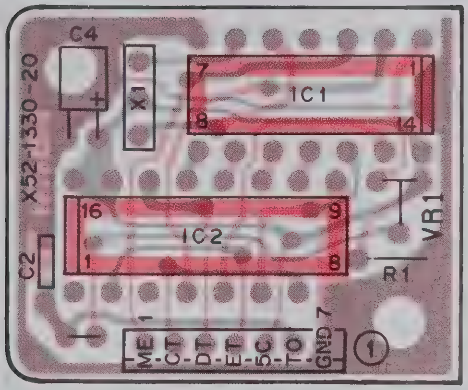
TU-7 (TONE)

TU-7 OUTSIDE VIEW



TU-7 PC BOARD VIEW

(X52-1330-20) Component side view



TU-7 PARTS LIST

Part No.	Re-marks	Description	Q'Ty	Ref. No.
TU-7 (GENERAL)				
B50-8045-00	N	Instruction manual	1	
E31-3150-05	N	Cable assembly	1	
G13-0826-04	N	Cushion	1	
G31-0826-04		Foam spacer	1	
H01-4679-03	N	Carton (Inside)	1	
H25-0029-04		Protective bag	2	
J32-0791-04	N	Hex. head boss	1	
N35-2604-41		Binding screw	2	
X52-1330-20	N	Tone unit	1	
TONE UNIT (X52-1330-20)				
CE04CW1A100M		Electro 10µ 10V	1	C4
CK73EB1H473K		Chip cap. 0.047µ	1	C2
C91-0757-05		Ceramic 0.001µ	1	C3
E40-5021-05		Mini-connector 7P	1	
L78-0018-05	N	Ceramic oscillator	1	X1
R12-3445-05		Trimming pot. 47kΩ	1	VR1
MB88306	N	IC	1	IC2
S7116A	N	IC	1	IC1

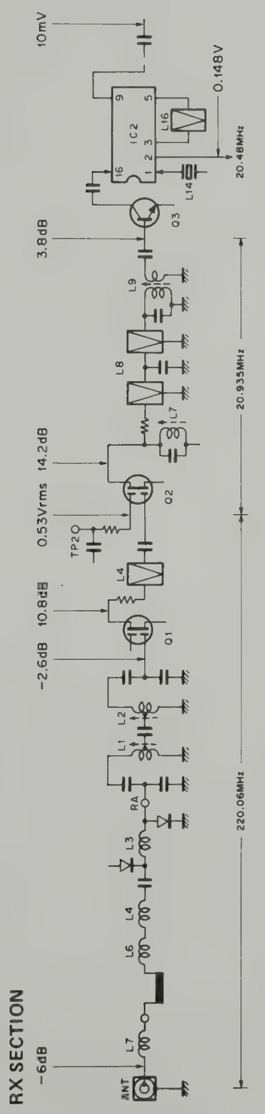
TU-7 INSTALLATION AND TONE FREQUENCY SETTING PROCEDURE

Available CTSS tone frequencies

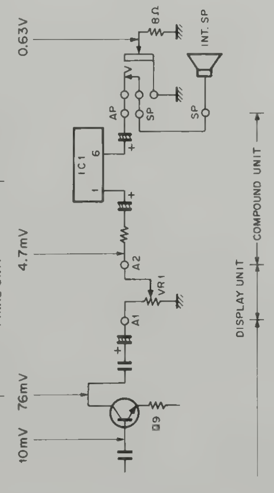
Hz	Hz	Hz
67.0	114.8	192.8
71.9	118.8	203.5
74.4	123.0	210.7
77.0	127.3	218.1
79.7	131.8	225.7
82.5	136.5	233.6
85.4	141.3	241.8
88.5	146.2	250.3
91.5	151.4	
94.8	156.7	
97.4	162.2	
100.0	167.9	
103.5	173.8	
107.2	179.9	
110.9	186.2	

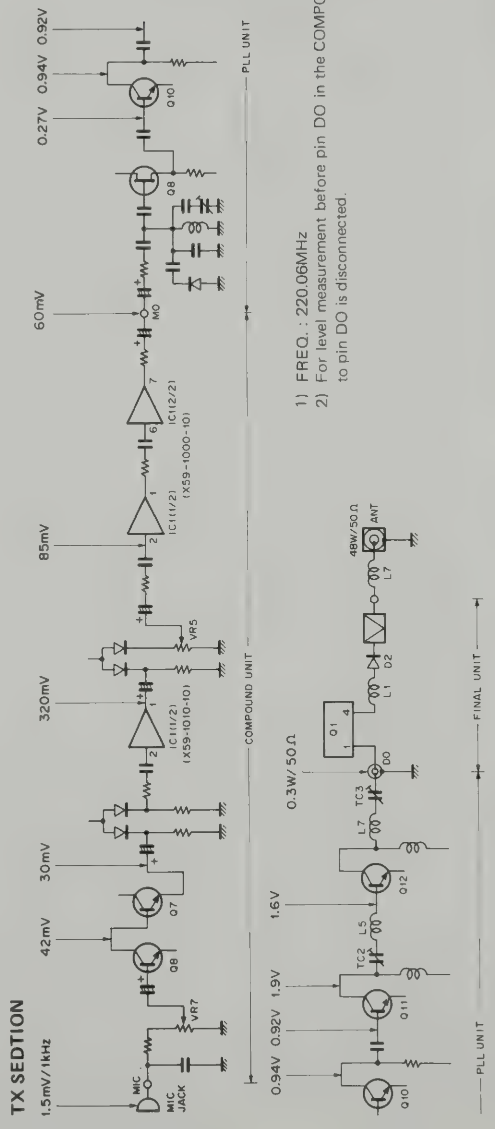
Refer to the instruction manual provided with the transceiver.

LEVEL DIAGRAM



1) First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG output signal at 220.06MHz/−6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same 20dB NQ sesitivity as that at initial input of the reference −6dBμ is taken.
2) In the stages after the product delector, the AF output level is measured.
3) Level measurement is made with a 0.01μF ceramic capacitor connected to the SSG output.
FREQ. : 220.06MHz, MOD : 1kHz, DEV : 3kHz

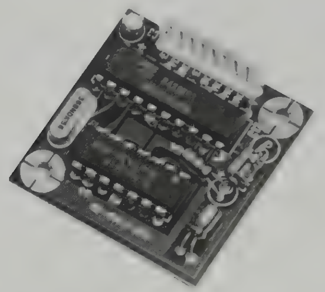




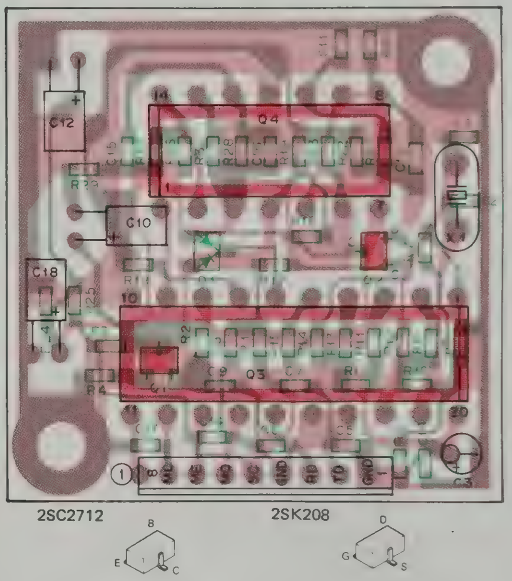
1) FREQ. : 220.06MHz
2) For level measurement before pin DO in the COMPOUND unit, coaxial cable connected to pin DO is disconnected.

MU-1 (MODEM)

MU-1 OUTSIDE VIEW



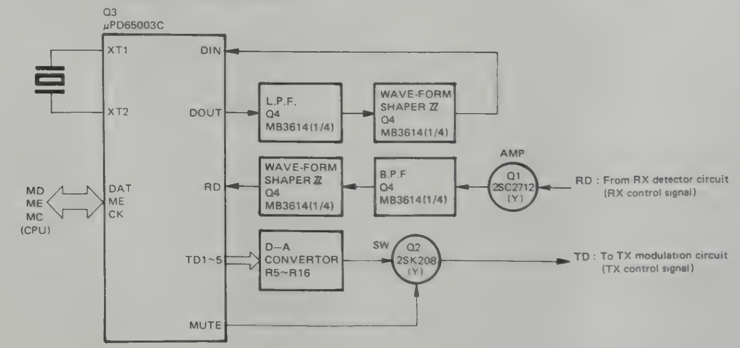
MU-1 PC BOARD VIEW
(X57-1140-20) Component side view



MU-1 PARTS LIST

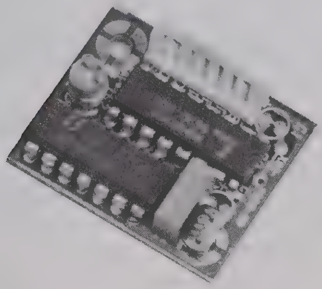
Part No.	Re-marks	Description	Q'Ty	Ref. No.
MU-1 (GENERAL)				
B50-8046-10	N	Instruction manual	1	
G13-0826-04		Cushion	1	
H01-4680-03	N	Carton (Inside)	1	
H25-0029-04		Protective bag	2	
J32-0791-04		Hex. head boss	1	
N35-2604-41		Binding screw	2	
X57-1140-20	N	MODEM unit	1	
MODEM UNIT (X57-1140-20)				
CC73FCH1H150J		Chip cap. 15P	2	C1,2
CE04CW0J220M		Electro 22μ 6.3V	1	C18
CE04CW1A100M		Electro 10μ 10V	2	C3,12
CE04CW1H010M		Electro 1μ 50V	1	C10
CK73EB1E473K		Chip cap. 0.047μ	1	C13
CK73FB1H102K		Chip cap. 0.001μ	1	C17
CK73FB1H103K		Chip cap. 0.01μ	1	C8
CK73FB1H223K		Chip cap. 0.022μ	7	C4,7,9,11, 14−16
CK73FB1H471K		Chip cap. 470P	2	C5,6
E40-5022-05		Mini-connector 8P	1	
L77-1295-05	N	X'tal oscillator 3.6864MHz	1	X1
RK73FB2A101J		Chip res. 100Ω	1	R17
RK73FB2A102J		Chip res. 1kΩ	1	R1
RK73FB2A103J		Chip res. 10kΩ	7	R8,10,12,14, 18,23,30
RK73FB2A105J		Chip res. 1MΩ	1	R16
RK73FB2A183J		Chip res. 18kΩ	5	R7,9,11,13,15
RK73FB2A221J		Chip res. 220Ω	1	R4
RK73FB2A223J		Chip res. 22kΩ	1	R26
RK73FB2A393J		Chip res. 39kΩ	2	R5,6
RK73FB2A394J		Chip res. 390kΩ	1	R2
RK73FB2A472J		Chip res. 4.7kΩ	4	R3,20,24,25
RK73FB2A682J		Chip res. 6.8kΩ	5	R21,22,27−29
RK73FB2A683J		Chip res. 68kΩ	1	R19
2SC2712(Y)		Chip TR	1	Q1
2SK208(Y)		Chip FET	1	Q2
μPD65003C-020		IC	1	Q3
MB3614		IC	1	Q4
DAN202(K)		Chip diode	1	D1

MU-1 BLOCK DIAGRAM



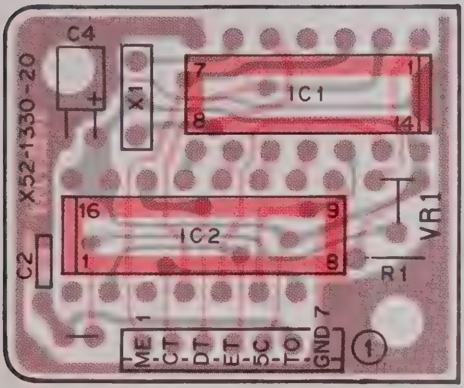
TU-7 (TONE)

TU-7 OUTSIDE VIEW



TU-7 PC BOARD VIEW

(X52-1330-20) Component side view



TU-7 PARTS LIST

Part No.	Re-marks	Description	Q'Ty	Ref. No.
TU-7 (GENERAL)				
B50-8045-00	N	Instruction manual	1	
E31-3150-05	N	Cable assembly	1	
G13-0826-04	N	Cushion	1	
G31-0826-04		Foam spacer	1	
H01-4679-03	N	Carton (Inside)	1	
H25-0029-04		Protective bag	2	
J32-0791-04	N	Hex. head boss	1	
N35-2604-41		Binding screw	2	
X52-1330-20	N	Tone unit	1	
TONE UNIT (X52-1330-20)				
CE04CW1A100M		Electro 10μ 10V	1	C4
CK73EB1H473K		Chip cap. 0.047μ	1	C2
C91-0757-05		Ceramic 0.001μ	1	C3
E40-5021-05		Mini-connector 7P	1	
L78-0018-05	N	Ceramic oscillator	1	X1
R12-3445-05		Trimming pot. 47kΩ	1	VR1
MB88306	N	IC	1	IC2
S7116A	N	IC	1	IC1

TU-7 INSTALLATION AND TONE FREQUENCY SETTING PROCEDURE

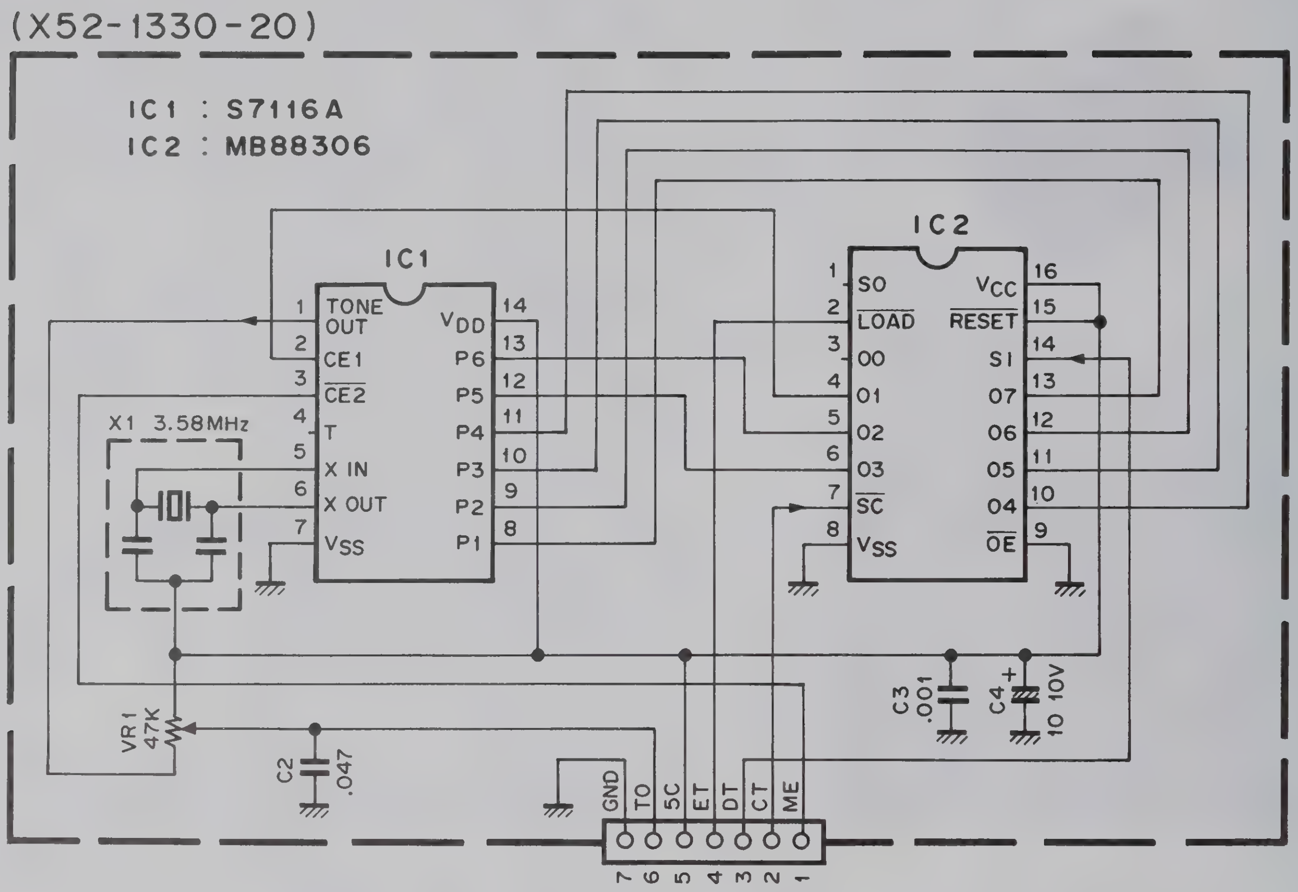
Available CTSS tone frequencies

Hz	Hz	Hz
67.0	114.8	192.8
71.9	118.8	203.5
74.4	123.0	210.7
77.0	127.3	218.1
79.7	131.8	225.7
82.5	136.5	233.6
85.4	141.3	241.8
88.5	146.2	250.3
91.5	151.4	
94.8	156.7	
97.4	162.2	
100.0	167.9	
103.5	173.8	
107.2	179.9	
110.9	186.2	

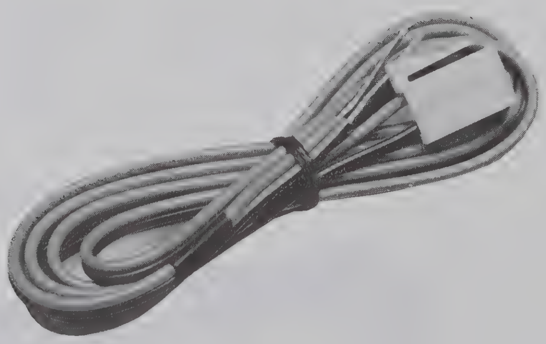
Refer to the instruction manual provided with the transceiver.

TU-7 (TONE)/PG-2K (DC POWER CABLE)

TU-7 SCHEMATIC DIAGRAM



PG-2K OUTSIDE VIEW



CIRCUIT DESCRIPTION

The negative feedback circuit samples the transmitted signal, rectifies this signal with D4, and applies the rectified signal to NF GAIN amplifier Q6 : 2SC2458(Y). This amplifier supplies a signal to Differential Amplifiers Q4 and Q5 : 2SC2458(Y) which control the bias applied to the PA module pin 2, and driver transistor Q12 of the PLL unit, via bias regulators Q2 : 2SD1406(Y) and Q3 : 2SA1015(Y). High/Low power switching is accomplished by applying a ground to pin number 1 of connector (2) on the FINAL unit. This causes VR3 to act as a voltage divider that controls the conduction of NF GAIN amplifier Q6.

Reflected power is coupled thru D5 on the FINAL unit and is used to control the conduction of Q7. This transistor function like Q6 to control differential amplifies Q4 and Q5, and thus the bias applied to the Power Amplifier.

Item	Symbol	Tc (°C)	Condition	Rating
Operating	Vcc	25		17V
DC current	Icc	25		7A
Operating case temp.	Tc (op)			−30~+110°C
Storage temp.	Tstg			−40~+110°C
Power input	Pin	25	Zg = Zl = 50Ω Vcc1 ≦ 12.5V	0.6W
Power output	Po	25	Zg = Zl = 50Ω	40W

Table 4 M57774 Max. rating (TM-3530A Final unit Q1)

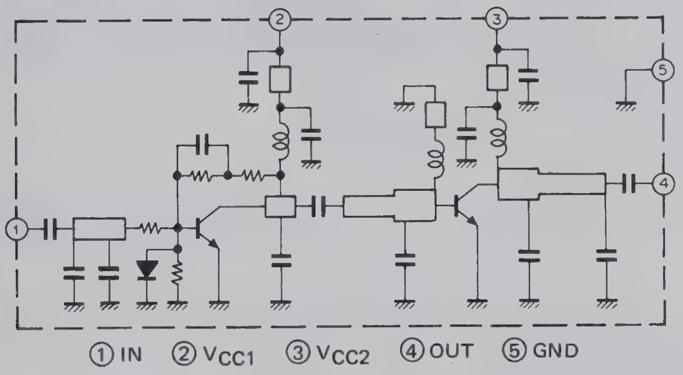


Fig. 4 M57774 Equivalent circuit

PLL CIRCUIT

The PLL circuit is divided into two main loops : transmit and receive.

Receive PLL Loop

The signal generated by the RX VCO (Voltage Controlled Oscillator) Q16 : 2SK125 is applied to buffer amplifier Q17 : 2SC2668(Y) and mixed with the HET (Heterodyne) signal by Q21 : 2SC2668(Y) where it becomes the PLL IF signal (12.865 to 17.86MHz). This PLL IF signal is then amplified by Q20 : 2SC2668(Y) and applied to the Phase Detector IC2 : MC145155P*K where it is divided to obtain a 5kHz signal. The divide ratio is determined by Serial Data from the CONTROL unit. This 5kHs signal is compared with 5kHz reference signal obtained by dividing 20.480 MHz Reference signal.

The Phase Detector compares the phase of these two signals and transmits an error control signal to the VCO. The control signal is filtered by an Active Low Pass filter composed of Q13 : 2SK30A(O) and Q14 : 2SC2458(Y) to remove any AC fluctuations to obtain a DC correction voltage. The correction voltage is used to change the capacitance of Varactor Diode D5 : 1SV50, which varies the output of the RX VCO to lock it on frequency.

If the phase difference is too great to be corrected by the control voltage applied to D5, an unlock signal is generated by the Phase Detector. This signal turns OFF Q15 : 2SC2458(Y) which turns OFF output amplifier Q18 : 2SC2668(Y) to prevent operation outside the authorized limits.

The PLL HET Oscillator, Q19 : 2SC2787(L) oscillates at 46.55MHz. This signal is applied to frequency quad Q22 : 2SC2688(Y) to obtain a signal of 186.200MHz which is applied to mixer Q21.

CIRCUIT DESCRIPTION

Transmit PLL Loop

The signal generated by the TX VCO Q8 : 2SK125 (220.00 to 224.995MHz) is mixed with the RX PLL output, by Q7 : 2SC2668(Y) and applied to the Transmit Phase Detector IC1 : MC145151P.

This signal and the 20.48MHz signal from IC2 are divided by 512, to obtain 40kHz. These two signals are compared and an error correction signal is applied to the Active Low Pass filter Q3, Q4 and Q5 : 2SC1775(E). Comparision at a frequency of 40kHz provides shorter response times, a real necessity in transmit. The DC correction voltage from the LPF is used to control varactor diode D2 : 1SV50.

The divide ratio is increased by 91 during transmit operations. This causes the TX VCO frequency to be locked at a frequency 455kHz higher than the RX VCO frequency which prevents internal mixing. When an error occurs that is greater than the correction voltage limits an unlock signal is generated by IC1. This signal controls the conduction of Q1 : 2SC2458(Y) which controls Q2 : 2SA1048(Y) to stop transmissions. Q2 interrupts the bias of the TX driver stage.

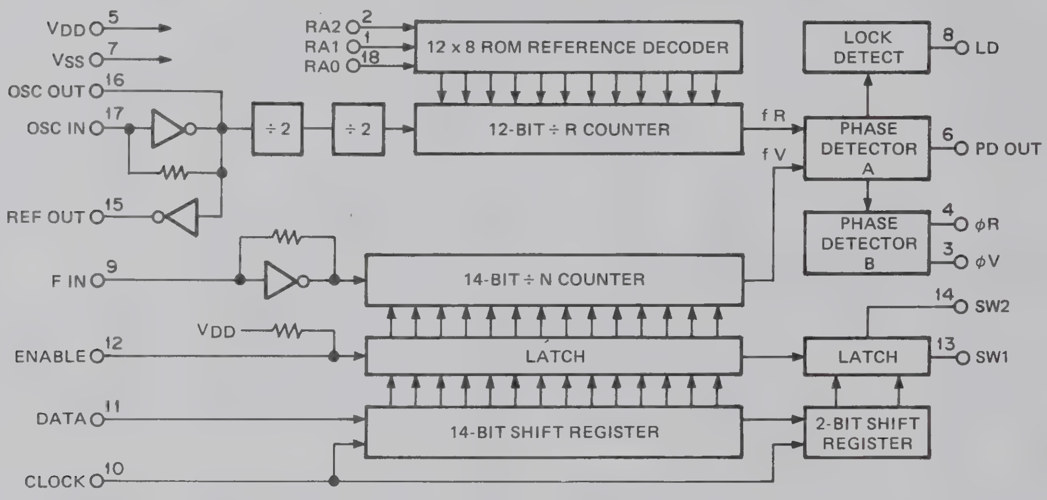


Fig. 5 MC145155P*K Block diagram (PLL unit IC2)

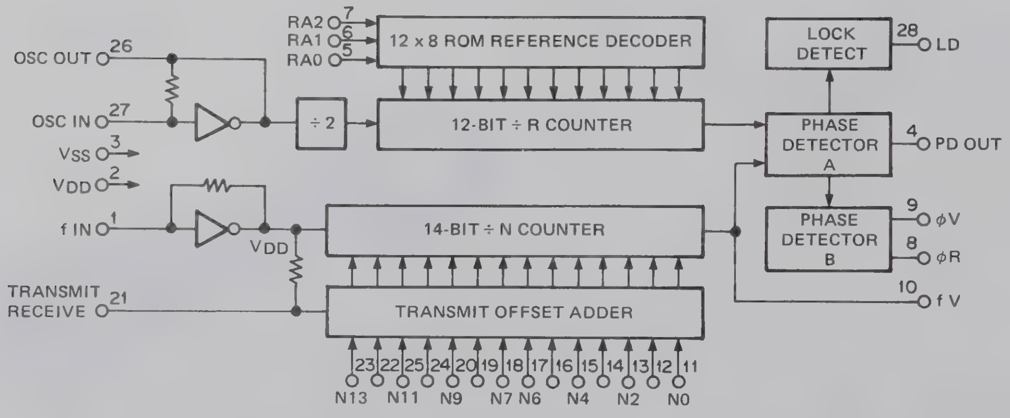
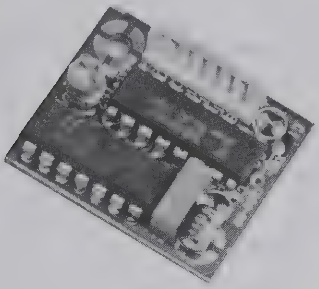


Fig. 6 MC145151P*J Block diagram (PLL unit IC1)

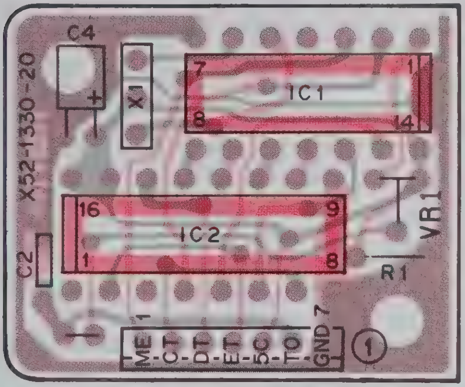
TU-7 (TONE)

TU-7 OUTSIDE VIEW



TU-7 PC BOARD VIEW

(X52-1330-20) Component side view



TU-7 PARTS LIST

Part No.	Re-marks	Description	Q'Ty	Ref. No.
TU-7 (GENERAL)				
B50-8045-00	N	Instruction manual	1	
E31-3150-05	N	Cable assembly	1	
G13-0826-04	N	Cushion	1	
G31-0826-04		Foam spacer	1	
H01-4679-03	N	Carton (Inside)	1	
H25-0029-04		Protective bag	2	
J32-0791-04	N	Hex. head boss	1	
N35-2604-41		Binding screw	2	
X52-1330-20	N	Tone unit	1	
TONE UNIT (X52-1330-20)				
CE04CW1A100M		Electro 10µ 10V	1	C4
CK73EB1H473K		Chip cap. 0.047µ	1	C2
C91-0757-05		Ceramic 0.001µ	1	C3
E40-5021-05		Mini-connector 7P	1	
L78-0018-05	N	Ceramic oscillator	1	X1
R12-3445-05		Trimming pot. 47kΩ	1	VR1
MB88306	N	IC	1	IC2
S7116A	N	IC	1	IC1

TU-7 INSTALLATION AND TONE FREQUENCY SETTING PROCEDURE

Available CTSS tone frequencies

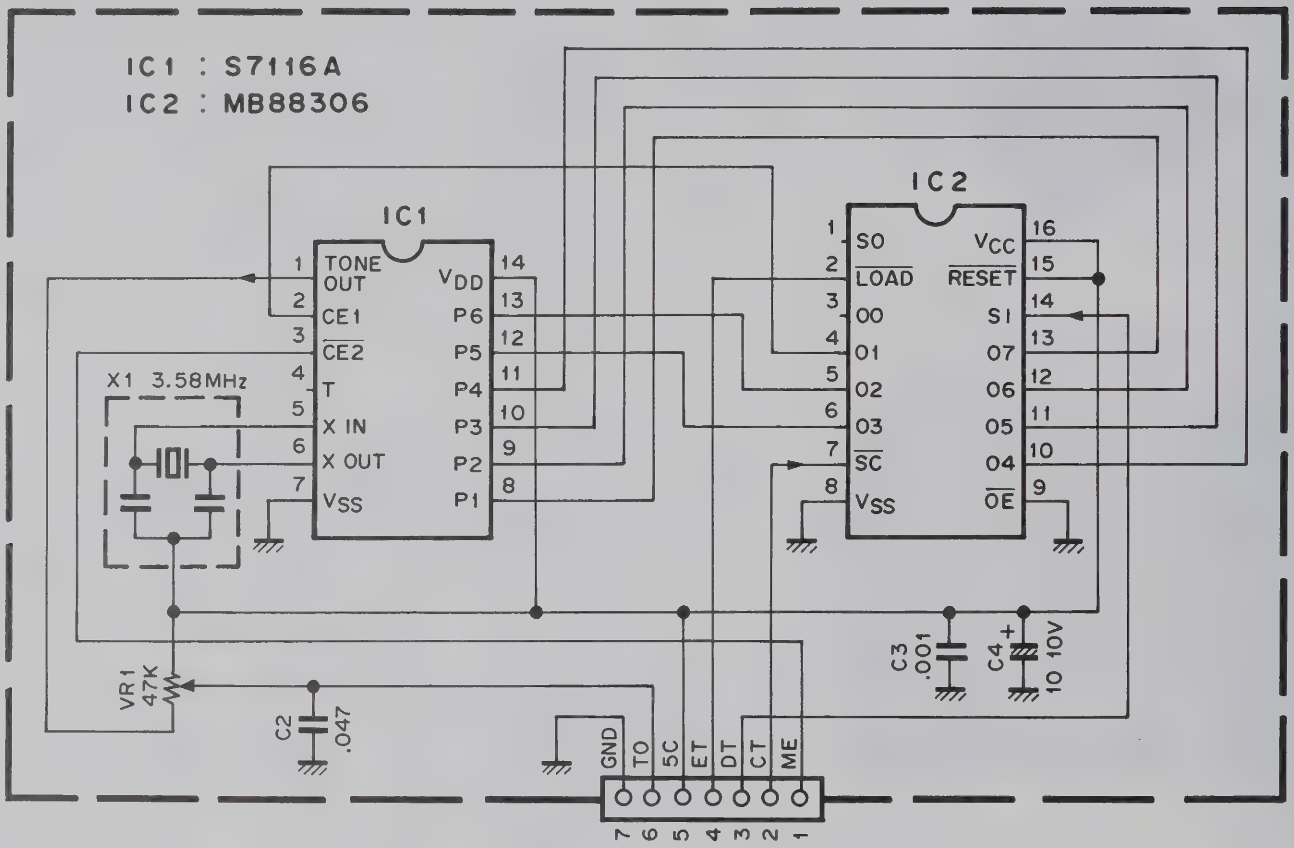
Hz	Hz	Hz
67.0	114.8	192.8
71.9	118.8	203.5
74.4	123.0	210.7
77.0	127.3	218.1
79.7	131.8	225.7
82.5	136.5	233.6
85.4	141.3	241.8
88.5	146.2	250.3
91.5	151.4	
94.8	156.7	
97.4	162.2	
100.0	167.9	
103.5	173.8	
107.2	179.9	
110.9	186.2	

Refer to the instruction manual provided with the transceiver.

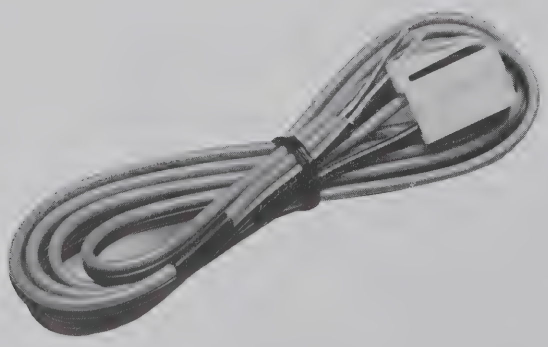
TU-7 (TONE)/PG-2K (DC POWER CABLE)

TU-7 SCHEMATIC DIAGRAM

(X52-1330-20)



PG-2K OUTSIDE VIEW

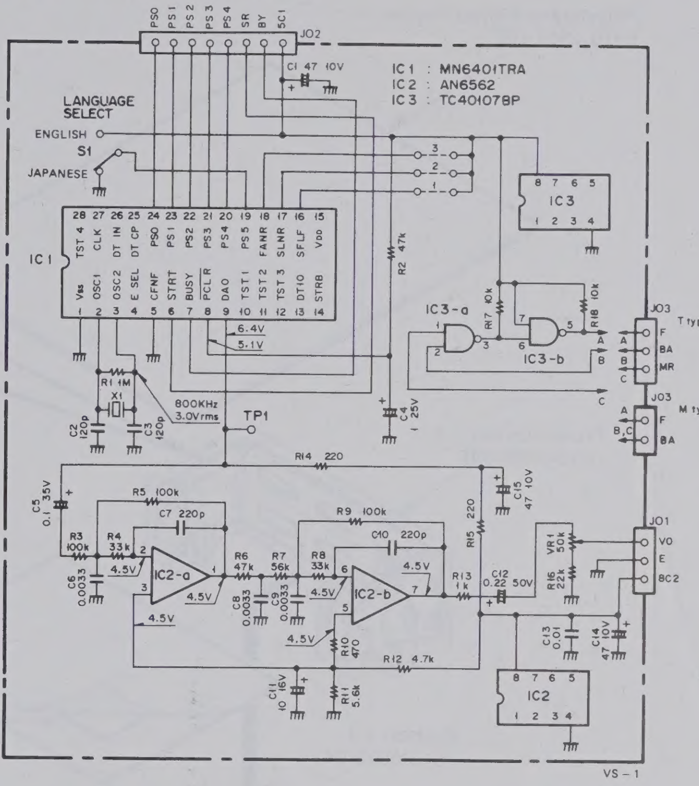


VS-1 (VOICE SYNTHESIZER)

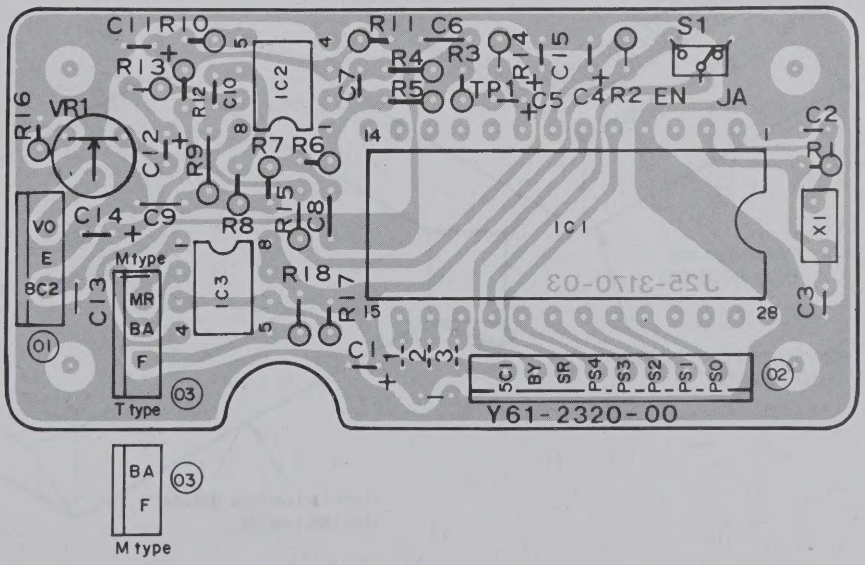
PARTS LIST

Part No.	Re-marks	Description	Ref. No.
B50-4035-00	N	Instruction manual	
CC45SL1H121J		C 120P x 2	C2,3
CE04W1A470M		E 47 10V	C1,14,15
CE04W1C100M		E 10 16V	C11
CE04W1HR22M		E 0.22 50V	C12
CK45B1H221K		C 220P x 2	C7,10
CQ92M1H332K		ML 0.0033 x 3	C6,8,9
CS15E1E010M		T 1 25V	C4
CS15E1V0R1M		T 0.1 35V	C5
C91-0131-05		C 0.01 (SP)	C13
E40-0273-05	△	Mini connector 2P M	
E40-0373-05	△	Mini connector 3P M	
E40-0373-05	△	Mini connector x 2 3P T	
E40-0873-05	△	Mini connector 8P	
H01-4481-03	N△	Packing carton (inside) M	
H01-4501-03	N△	Packing carton (inside) T	
H25-0029-04		Protective bag x 2	
L78-0006-05	N	Ceramic OSC	X1
N89-3006-46		Tapping screw x 4	
R12-4408-05		Trim. pot. 50kΩ	VR1
S31-1411-05	N	Slide switch	S1
AN6562	N	IC	IC2
MN6401TRA	N	IC	IC1
TC40107BP	N	IC	IC3

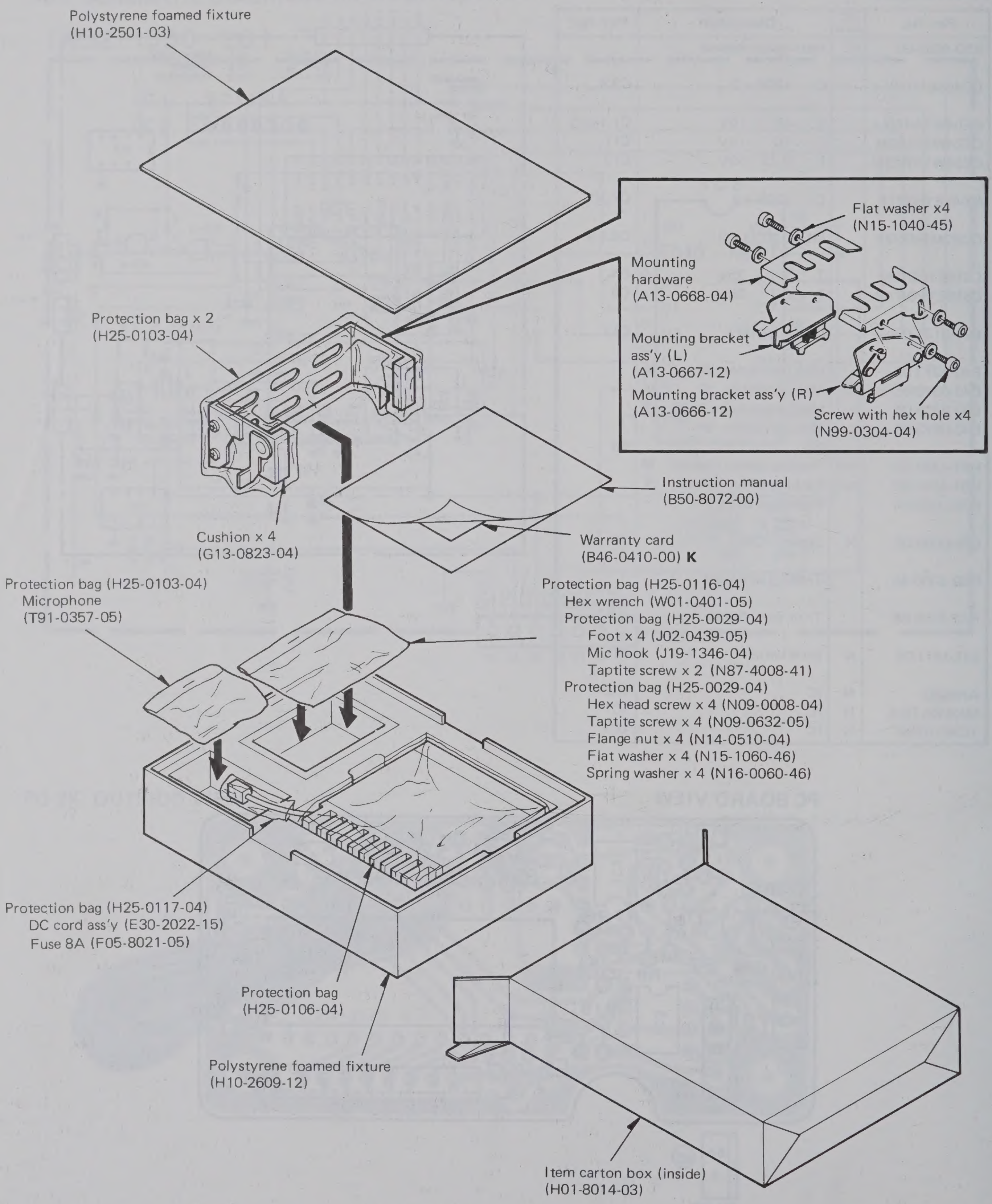
SCHEMATIC DIAGRAM



PC BOARD VIEW



PACKING


Polystyrene foamed fixture
(H10-2501-03)
Flat washer x4
(N15-1040-45)
Mounting
hardware
(A13-0668-04)
Protection bag x 2
(H25-0103-04)
Mounting bracket
ass'y (L)
(A13-0667-12)
Mounting bracket ass'y (R)
(A13-0666-12)
Screw with hex hole x4
(N99-0304-04)
Instruction manual
(B50-8072-00)
Cushion x 4
(G13-0823-04)
Warranty card
(B46-0410-00) K
Protection bag (H25-0103-04)
Microphone
(T91-0357-05)
Protection bag (H25-0116-04)
Hex wrench (W01-0401-05)
Protection bag (H25-0029-04)
Foot x 4 (J02-0439-05)
Mic hook (J19-1346-04)
Taptite screw x 2 (N87-4008-41)
Protection bag (H25-0029-04)
Hex head screw x 4 (N09-0008-04)
Taptite screw x 4 (N09-0632-05)
Flange nut x 4 (N14-0510-04)
Flat washer x 4 (N15-1060-46)
Spring washer x 4 (N16-0060-46)
Protection bag (H25-0117-04)
DC cord ass'y (E30-2022-15)
Fuse 8A (F05-8021-05)
Protection bag
(H25-0106-04)
Polystyrene foamed fixture
(H10-2609-12)
Item carton box (inside)
(H01-8014-03)

SPECIFICATIONS

[General]

Frequency range	220 MHz to 225 MHz
Mode	FM F3 (F3E), F2 (F2D) (Control signal for DCL system)
Antenna impedance	50 ohms
Power requirement	13.8 VDC ±15%
Grounding	Negative
Operating temperature	–20°C to +50°C (–4°F to +122°F)
Current drain	0.6 A in receive mode with no input signal (TM-3530A) Approx. 6.5A in HI transmit mode Approx. 2.5A in LOW transmit mode
Dimensions	180 mm wide, 60 mm high 195 mm deep (TM-3530A) (Projection not included)
Weight	1.8 kg (4 lbs) : TM-3530A

[Transmitter]

Output power (at 13.8 VDC, 50 ohms load)	HI: 25 W min. TM-3530A LOW: 5 W approx. (Adjustable up to out 20 W ..... TM-3530A) **Note:** Recommended duty cycle 1 minute : Transmission 3 minutes : Reception
Modulation	Reactance
Frequency stability	Less than ±15 PPM
Spurious radiation	Less than –60 dB
Maximum frequency deviation	±5 kHz
Audio distortion (at 60% modulation)	Less than 3% (300 Hz to 3000 Hz)

[Receiver]

Circuitry	Double conversion superheterodyne
Intermediate frequency	1st: 20.935 MHz, 2nd: 455 kHz
Sensitivity	SINAD 12 dB: Less than 0.35 μV S+N/N : More than 50 dB at 1 mV input
Selectivity	More than 12 kHz (–6 dB) Less than 24 kHz (–60 dB)
Spurious response	Better than 70 dB (except fd-IF/2)
Squelch sensitivity	Less than 0.125 μV (threshold)
Scan stop level	Less than 0.2 μV (threshold)
Output	More than 1.5 W across 8 ohms load (5% distortion)
External speaker impedance	8 ohms

[DCL control]

Code	NRZ equal-length code
Modulation	MSK modulation
Frequency deviation	±3.5 kHz reference
Mark frequency and deviation	1200 Hz ±200 PPM
Space frequency and deviation	1800 Hz ±200 PPM
Code transmission speed and deviation	1200 bits/second ±200 PPM

Note: Circuit and rating are subject to change without notice due to development in technology.

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